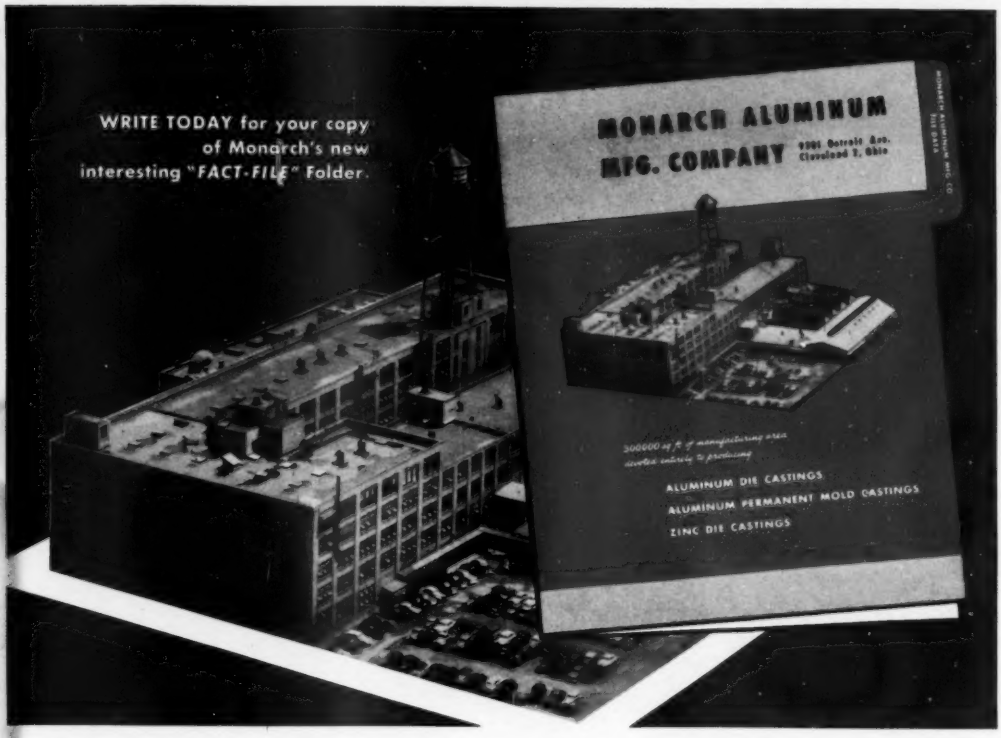
DIE CASTINGS

INCLUDING A SPECIAL FINISHING SECTION

May
1951

THE PRODUCT DESIGN MAGAZINE FOR USERS AND POTENTIAL USERS OF DIE CASTINGS


WRITE TODAY for your copy of Monarch's new interesting "FACT-FILE" Folder.
MONARCH ALUMINUM MFG. COMPANY
9701 Detroit Ave. Cleveland 2, Ohio
ALUMINUM DIE CASTINGS
ALUMINUM PERMANENT MOLD CASTINGS
ZINC DIE CASTINGS

MONARCH OFFERS MORE than just castings

Monarch's Mobilized Facilities represent an unusual type of integrated service... which few foundries are in a position to offer. These facilities are available for many individual services which may be completely independent of casting requirements.

Monarch's casting production in aluminum permanent mold, aluminum and certified zinc die castings is recognized throughout industry. Monarch offers the obvious benefits of this coordinated service... *in one plant, under one management.*

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* Hardened Steel Insert for Wear

Die Casting for Special Shape and Contour

The exact die casting here illustrated may not apply to your design but it may give you a valuable idea for future use.

Madison-Kipp has developed a great many insert jobs for ordnance and commercial parts that have solved pressing problems.

When you have die casting requirements, please remember to write Madison-Kipp at Madison, Wisconsin.

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- *Originators of Really High Speed* AIR TOOLS

MAY 1951
Vol. 9 No. 5

DIE CASTINGS

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COVER—ALMOST EVERY DEGREE OF SURFACE FINISH from rough grinding and flash removal to a high burnishing can be obtained on die castings by barrel finishing methods. Whether as a pre-plating operation or a final treatment, this bulk processing method can be used to advantage for die castings in all alloys. High production quantities at low labor cost per unit are characteristic of barrel finishing. Complete review of this process as used on die cast parts starts on page 39.

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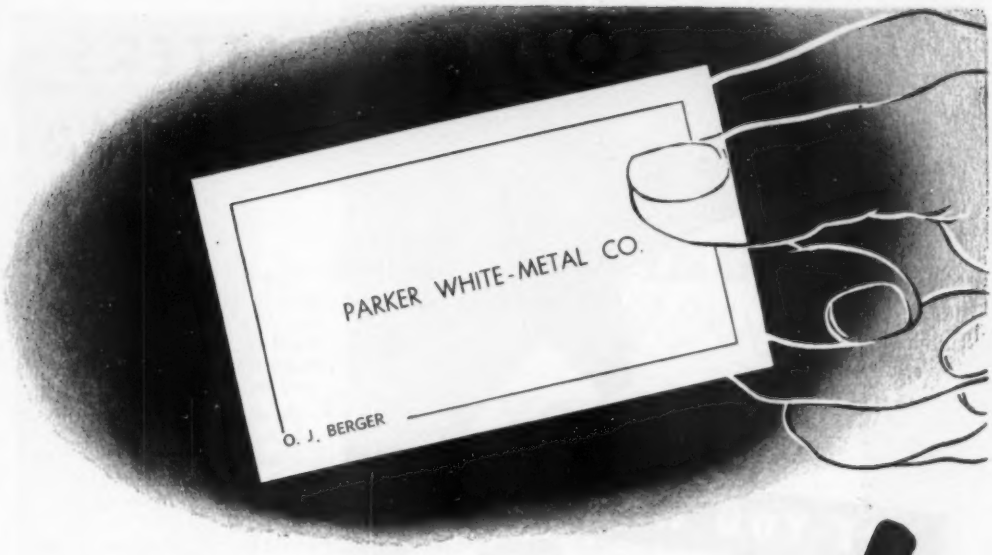

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He can help YOU

The Parker representative sells more than just Die Castings . . . he offers to you an engineering and design service. He can show you how that difficult part can be produced quickly, economically, of exactly the right alloy and strength to meet your exacting requirements. Parker is one of the oldest names in Die Castings. The experience and know-how here at Parker is yours for the asking. Parker Die Castings have been designed and produced for nearly every industry. We are certain that we can help YOU. Call on Parker engineers on your next design problem.

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ARE YOU WANDERING?
• Need die castings? Newton-New Haven has the facilities for the production of zinc and aluminum alloy die castings.
Place your die casting responsibilities with Newton-New Haven. Here is an organization that has the equipment, the personnel, the experience and the whole-hearted desire to help.
Newton-New Haven has prepared a booklet on "Dimensioning Die Castings." This is a basic data that every Engineer and Designer should have. Write on your company letterhead for your copy.
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LETTERS TO THE Editor

HELPFUL

In a few words let me take this time to tell you that your magazine Die Castings is one of the finest of its kind. I have read it many times and always found it very interesting each time.

So at this time I would like to ask you to put me on your mailing list. At the present time I am doing quite a bit of work in the die casting field, that is, in designing dies. I feel that it would be helpful to me in many ways.—C.R.S.

HOT FACTS

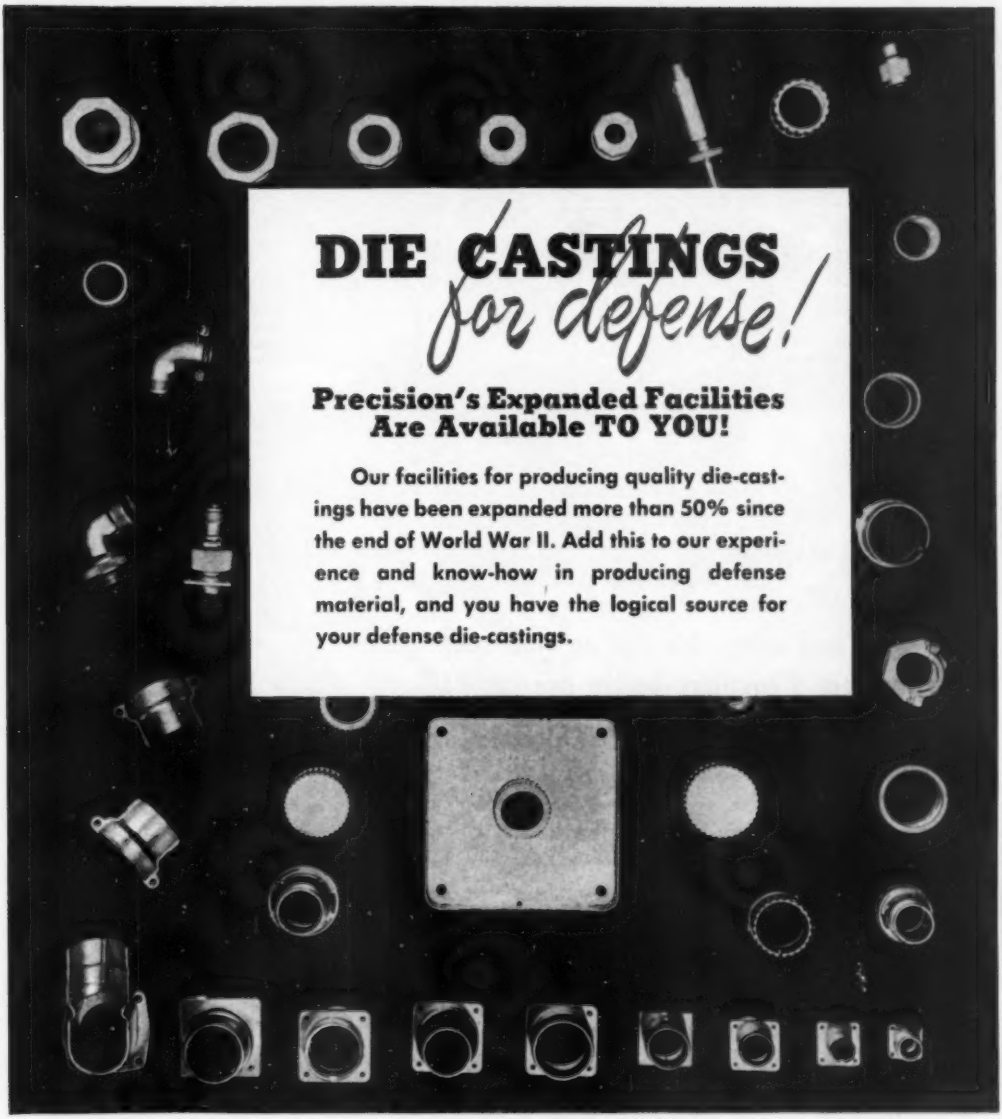
We are interested in receiving two copies of the following article published in your magazine Die Castings: *Hot Facts on a Cold Subject*, V. 7, Dec. 1949, pg. 17, 53 and 54.—R. G. (Brazil).

Copies forwarded.—Ed.

FINISHING DIE CASTINGS

Understand your March, 1951, issue of "Die Castings" magazine contains a number of articles of interest in connection with finishing of die castings. Would like very much to have a copy. Please advise system to be used.—C.O.H.

There has been considerable interest in the special March issue which was devoted to the effect of finish specification on product design, with special attention to the use of substitute finishes for war-curtailed materials, and also, finishes which can be used for military jobs. In a future issue, a detailed study of the types of organic finishes available now for surface coatings on die cast products will be presented.—Ed.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for defense!
Precision's Expanded Facilities
Are Available TO YOU!
Our facilities for producing quality die-castings have been expanded more than 50% since the end of World War II. Add this to our experience and know-how in producing defense material, and you have the logical source for your defense die-castings.

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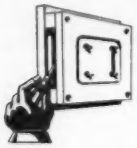
Syracuse, N. Y. · Cleveland, O. · Kalamazoo, Mich. · Chicago, Ill.
British Affiliation — Wolverhampton Die Casting Co., Wolverhampton, England

"...and using this mix on each shot we got 9 castings before one stuck!"

1. Dip blow pipe in Die Slick

2. Spray sparingly over die cavity face



3. Spray on ejector mechanism

Don't risk getting stuck with "part time" die lubricants. Standardize on Die Slick: it works *all the time*. Now used by 78% of all die casters, Die Slick is inexpensive; but most important, it saves many times its cost—consistently prevents sticking, scoring, and soldering—eliminates down time—assures high production all along the line.

Moreover, it assures good surface finish, often eliminates plating and finishing problems before they start. It comes in one, five, and 55 gallon containers—in five grades to suit all requirements.

Try a week's supply of Die Slick on your most difficult jobs. Simply specify quantity, and the type of alloy on which you will use it. If you are not completely satisfied, simply return the invoice unpaid.

start every job with **DIE SLICK**

the industry's standard die lubricant

G. W. SMITH & SONS, INC., 5403 Kemp Road, Dayton 3, Ohio

LITERATURE AND SERVICES OFFERED IN THIS MONTH'S ADS

NOTE: Circle numbers on the enclosed postcard to indicate literature, samples or trial services you wish to receive.

No. 27. SAMPLES OF TINY DIE CASTINGS and bulletins covering production facilities are offered by the Gries Reproducer Corp. This company specializes in very small zinc die castings.

No. 28. FURNACES FOR MELTING ZINC and aluminum alloys are described in literature offered by the Stroman Furnace & Engineering Co. These furnaces are built in both dip-out and tilt models in capacity ranges from 200 to 14,000 pounds.

No. 29. PHYSICAL PROPERTIES AND COMPOSITIONS of USCO aluminum alloys are given on a slide-chart offered by the U. S. Reduction Co. By positioning the pointer under the alloy number, the user can read the information in windows provided.

No. 30. A CHECK LIST OF STRIPPERS for removal of enamels, paints, varnishes or lacquers is offered by Enthone, Inc. If none of the company's standard strippers will do a job, the company offers to develop a special formula for a customer.

No. 31. A TECHNICAL REPORT ON BARREL FINISHING is offered by the Wyandotte Chemicals Corp. In addition to a line of compounds for barrel finishing, the company manufactures a line of industrial cleaners and surface treatments.

No. 32. DETAILS ON MASKING FIXTURES for all types of spray painting operations are offered by the Conforming Matrix Corp. Information is also offered on standard and specialized spray painting machines incorporating masking fixtures.

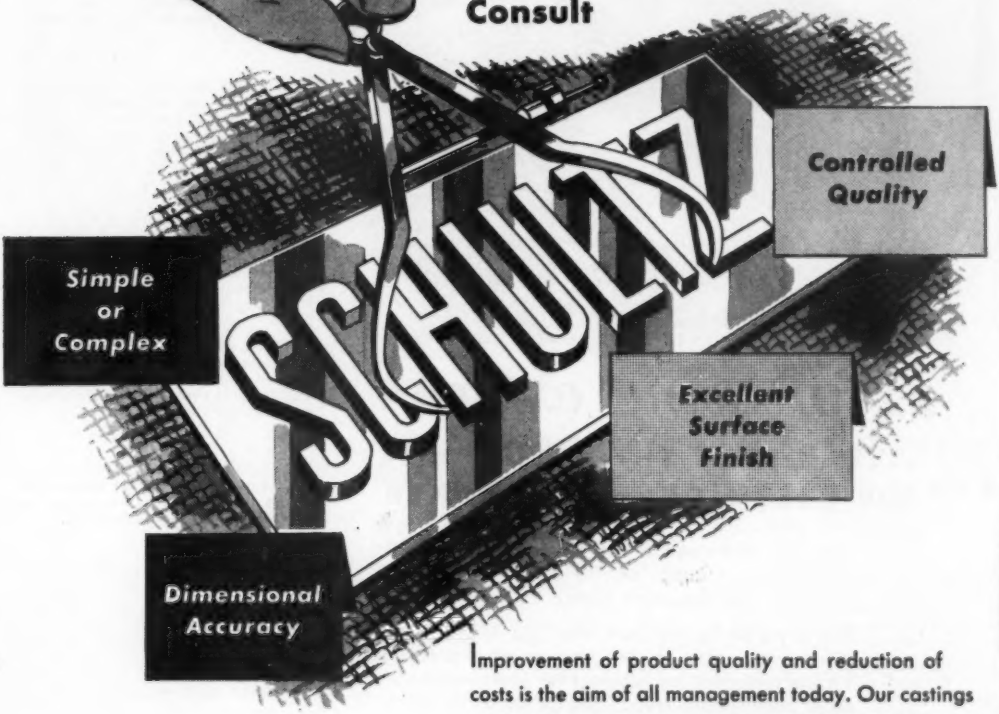
No. 33. GRINDER-MILLERS manufactured by the Precise Products Co., can be attached to lathes and other machine tools. They are used for grinding, milling, micro-finishing and polishing.

No. 34. "ADVANCED BARREL FINISHING" is the title of a booklet offered by the Almco Div., Queen Stove Works, Inc. The booklet gives details of the Supersheen method of controlled barrel deburring, grinding and finishing. A copy of the company's latest catalog is also available.

No. 35. FURNACES FOR MELTING DIE CASTING ALLOYS, such as tin, lead, zinc and aluminum, are illustrated and described in Bulletin C-1A, issued by the Eclipse Fuel Engineering Co.

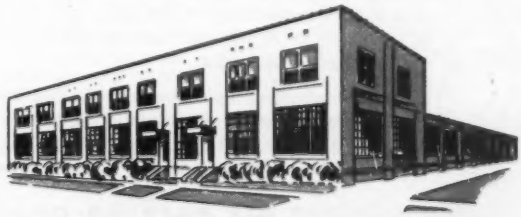
(Continued on Page 8)

For Zinc Alloy Die Castings That Measure Up To The Highest Standards Consult



Improvement of product quality and reduction of costs is the aim of all management today. Our castings are both competitively priced and outstanding in quality, and can help you build a better product for less. May we quote on your requirements today?

Our Engineers Are At Your Service



SCHULTZ DIE CASTING COMPANY
1810 CLINTON STREET • TOLEDO 7, OHIO

A pleasing exterior

...IS OFTEN THE RESULT OF DIE CASTINGS *by* MILWAUKEE

One big advantage of the die casting process is the fact that it usually permits exact interpretation of the product designer's ideas.

This is especially desirable when die castings constitute all or part of the exterior of a product. Typical examples are housings for gears, motors or other mechanisms; levers, control knobs or handwheels; end-plates, covers or bases.

When die castings are used for such parts, the designer usually has wide latitude in combining curves, contours and plane surfaces to achieve results that are pleasing to the eye, and pleasing to the touch, or which contribute to more comfortable control or operation.

Here at *Milwaukee*, a pleasing exterior has always been an important consideration in the design and production of die castings which add to the eye appeal or touch appeal of the finished product.

MILWAUKEE DIE CASTING COMPANY
1019 N. FOURTH STREET • MILWAUKEE 3, WISCONSIN

LITERATURE AND SERVICES

(Continued from Page 6)

No. 36. "HOW TO DIMENSION PRINTS FOR DIE CASTINGS" is the title of a booklet offered by the Newton-New Haven Co. The booklet gives detailed instructions for guidance in dimensioning die casting drawings.

No. 37. THE TUMB-L-MATIC PROCESS, a wet or dry barrel finishing process, is described in literature available from Tumb-L-Matic, Inc.

No. 38. CASE HISTORIES and other information on backstand belt grinding and finishing with 3M equipment is offered in a booklet published by the Minnesota Mining & Mfg. Co. The booklet also tells about the 3M survey service for converting present equipment.

No. 39. SAMPLES WILL BE PROCESSED by the Grav-i-Flo barrel finishing process. Information on this service can be obtained from the Grav-i-Flo Corp.

No. 40. A FOTO FACTS FILE, containing case histories, photos and wiring diagrams of controlled air power devices is offered by the Bellows Co. The company also offers a bulletin "Faster, Safer, Better Production."

No. 41. DETAILS OF THE HYDROHONE PROCESS, a wet abrasive blast cleaning and polishing system usable on die casting dies, are available from the Pangborn Corp.

No. 42. A FOLDER DESCRIBING THE MONARCH Aluminum Mfg. Co.'s plant and its zinc and aluminum die casting facilities is available from the company.

No. 43. A COMPACT, COMPLETELY AUTOMATIC DRILL HEAD with self-contained air and controlled feed and speed is described in a 16-page bulletin offered by the Dumore Co.

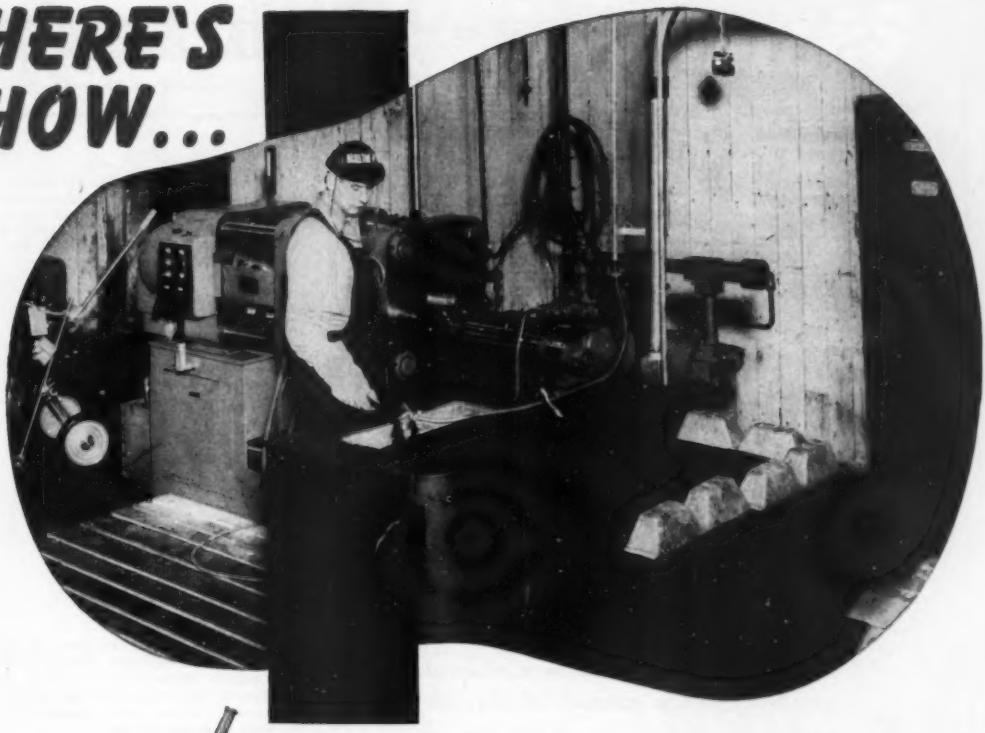
No. 44. BURNISHING MIXTURES and suggestions on how to use them are contained in a catalog issued by the Abbott Ball Co. The company manufactures burnishing shapes made of bearing ball steel in many shapes and sizes.

No. 45. INFORMATION ON PLATING with Daniels OLS type plating barrels may be obtained from the Daniels Plating Barrel & Supply Co.

No. 46. LITERATURE AND DESIGN INFORMATION on aluminum and magnesium die castings are available from Litemetal Dicast, Inc.

(Continued on Page 10)

HERE'S HOW...



Bag Boy® MANUFACTURERS INCREASED PRODUCTION RATE 5 TIMES

... with the LINDBERG-Fisher 2-Chamber Furnace

Consult your Lindberg-Fisher representative for recommendations on your production problems.

Jarman-Williamson, Portland, Oregon, manufacturers of BAG-BOY—the folding golf cart, utilize the Lindberg-Fisher 2-Chamber Melting Furnace in casting 14 parts for the BAG-BOY. Here's their story as they told it to us:

"Deluxe wheels on our BAG-BOY were becoming a bottleneck. When we used a sand cast wheel, one man on an 8-hour shift averaged 108 wheels—(MACHINING TIME ALONE)! We installed a Lindberg-Fisher 2-Chamber induction furnace as a running mate to our H.P.M. die casting machine. Management policy of buying the best for the job has already paid off—the nine-inch wheel is hitting the assembly line at the rate of 100 an hour. Using a 1¼ lb. shot at a temperature of 1180°F, rejects are less than 5%. We're running 180 lbs. of metal through the furnace an hour (including trimmings, scraps, etc.) with no appreciable temperature variation from the necessary 1180°F! This keeps our unit operating at peak performance. The operator does not depend on test shots or 'feel'.

"As our operation has been running for only a short time it's too early to set up operation cost figures, but we do have some interesting facts: 1) Production rate is five times greater than the previous method; 2) During the weekend idling period, the furnace holds 500 lbs. of aluminum molten for 62 hours on 456 KW, which in Portland costs $4.62; 3) In one day, we charged 1440 lbs. of metal—and removed it at the rate of 3 lbs. per minute from the ladling side—no temperature variation could be noted; 4) We get a high percentage of good castings with comparatively inexperienced help. Our two operators made their first shots on this machine—within 30 minutes good castings were on their way to the production line. To a great extent this is attributable to the constant temperature maintained by our Lindberg-Fisher; 5) Our furnace is within arms reach of the shot well, allowing easier, smoother operation. This is possible only because of the extremely low heat loss from the furnace, which adds materially to the operators comfort and efficiency.

This sums up the fact that to date we are enormously pleased with our purchase. The Lindberg-Fisher induction furnace is proving all that was claimed for it by its representatives."

LINDBERG-Fisher MELTING FURNACES

LINDBERG ENGINEERING COMPANY • 2463 West Hubbard Street, Chicago 12, Illinois

DEPENDABLE
BETTER METHODS
SUPER CAST
DIE CASTINGS
BETTER DIE CASTINGS
SINCE 1919

The meaning of a signature!

Through a quarter of a century of knowing how, the SUPER CAST reputation for Better Methods—Better Die Castings, has been recognized.

Sound engineering, metallurgical knowledge and skilled techniques have achieved and maintained a standard of superior quality.

SUPER CAST has kept faith, always deserving the mark it bears. SUPER CAST means die castings for those who want the best.

A sound, time-tested institution and a sound time-tested product have won confidence and widespread endorsement.

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SINCE 1919

THE SUPERIOR DIE CASTING COMPANY
1001 London Road CLEVELAND 10, OHIO
Detroit Chicago Pittsburgh
Philadelphia New York

LITERATURE AND SERVICES

(Continued from Page 8)

No. 47. A HIGH SPEED TAPPING HEAD in which tap driving pressure is automatically regulated is described in literature offered by the Procunier Safety Chuck Co. Operators can detect dull taps by an increase in driving pressure needed.

No. 48. ENAMEL FILLING OF DIE CAST parts with the Acroprinter, manufactured by the Acromark Co., is explained in available literature.

No. 49. CAST IRON INGOT MOLDS and allied foundry equipment for use in die casting are described and illustrated in C. H. Milles Foundry Co.'s Catalog No. 101.

No. 50. SIMULATED METAL FINISHES are given to die castings with Platelustre, a paint recently marketed by the Maas & Waldstein Co. Literature is available on this product, which can be used to simulate copper, brass or bronze plating.

No. 51. SAMPLE PARTS WILL BE PROCESSED FREE of charge in Globe tilting tumbling barrels. Information on this service is available from the Globe Stamping Div., Hupp Corp.

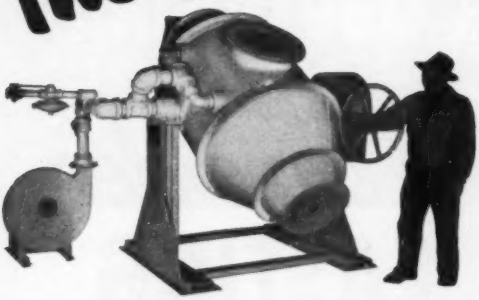
No. 52. INFORMATION ON SOIL REMOVAL is offered by Oakite Products, Inc. Soil to be removed should be specified. The company also has available a booklet titled "Some Good Things to Know About Metal Cleaning."

No. 53. "BLACK MAGIC," A BLACK OXIDE FINISH which can be hand applied or used with fully automatic equipment, is described in a catalog offered by the Mitchell-Bradford Chemical Co. This finish meets military specifications.

No. 54. THREE BULLETINS ON BARREL FINISHING are available from the D. J. Murray Mfg. Co. The bulletins give details on the process as well as on the company's equipment. The company also offers to process parts free of charge.

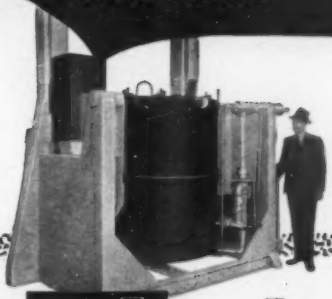
The Foremost Furnaces

for Melting any type of Non-Ferrous Metals in Foundries, Die Casting and Permanent Mold Plants



STROMAN MODEL "BFC" HAND TILT BARREL TYPE MELTING FURNACE FOR ALUMINUM

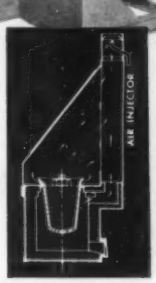
Featuring "Tangential Firing" which produces a most efficient combustion condition, creating a melting atmosphere that keeps metal loss and dross accumulation at a minimum. Charges through the top or rear door which is also used for drossing metal and cleaning the furnace. Built in 500 lb. capacity and larger. Oil or gas fire.

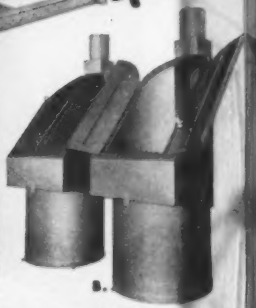


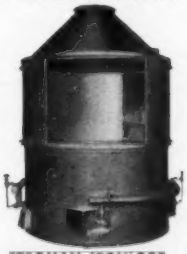
STROMAN MAGNESIUM AND ALUMINUM MELTING AND HOLDING FURNACES

A. Hydraulic Tilt Magnesium and Aluminum melting furnace handling from 500 to 3000 lbs. of aluminum. Incorporates the famous Stroman Stationary Lip Pour, which creates a constant pouring arc at any desired pouring speed. Saves time and metal.

B. Stationary Super-Heating or Melting Furnaces, Type S. F. Designed to deliver the correct super-heat to magnesium after it has been melted in larger furnaces, and before it is poured into the molds. Can also be used for breakdown or holding. They have all safety features. Are available for cast steel pots or fabricated steel pots. Furnaces may be equipped with hoods if so desired, for the venting of combustion and other gasses. Write for bulletin No. 100.







STROMAN IRON POT MELTING FURNACES FOR ZINC OR ALUMINUM

These furnaces are highly recommended as breakdown furnaces for zinc and aluminum die casting and permanent mold plants. They also excel as holding furnaces. They can be supplied either with or without hoods to exhaust fumes and heat. Their construction causes longest pot life and lowest fuel costs. Choice of automatic or manual controls and oil or gas fire. Capacities from 212 to 14,000 lbs. zinc.

Write for Bulletin No. 115

STROMAN HAND TILT CRUCIBLE MELTING FURNACE FOR BRASS, BRONZE, ALUMINUM AND OTHER ALLOYS

Capacities from No. 40 to No. 500 Crucible. Most efficient in operation. Rugged construction assures longest life and trouble-free operation. Oil, Gas or Combination Fire.

Write for Bulletin No. 105

STROMAN TYPE "MC" ALUMINUM DIP-OUT REVERBERATORY FURNACE

Bath capacity from 500 to 10,000 lbs. Aluminum

A combination of breakdown and holding furnaces makes this the most economical furnace ever designed for aluminum melting. It can be used for melting, holding, alloying, fluxing, for either casting or producing ingots. Cold metal does not reach the molten bath. Hot metal is always available for dipping. No iron pots or crucibles to buy. Oil, gas or combination oil-gas fire. Complete automatic controls are available if desired.

WRITE FOR COMPLETE CATALOGUE ON ALL TYPES OF FOUNDRY EQUIPMENT

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

consider DIE CASTING when redesigning for LOWER COSTS

THE DIE CASTING PROCESS: Speed of production is the essence of the die casting process—the shortest distance between raw material and finished product; it is a precision, low-unit labor process, capable of producing direct from the raw material the most complex parts in nearly finished form at a single operation.

ZINC DIE CASTINGS: Zinc is the most adaptable metal for the die casting process and provides the best combination of physical and chemical properties. Zinc die castings are stable, strong, and can be cast to close tolerances; they are easily machined and a large variety of beautiful metallic and organic finishes can be readily applied to the castings.

Industry's recognition of these factors is indicated by the phenomenal growth of die casting as a production tool plus the fact that nearly 75% of all die castings by weight are made of zinc. **DIE CASTING** is the Process • **ZINC,** the Metal • **BUNKER HILL,** the Preferred Zinc

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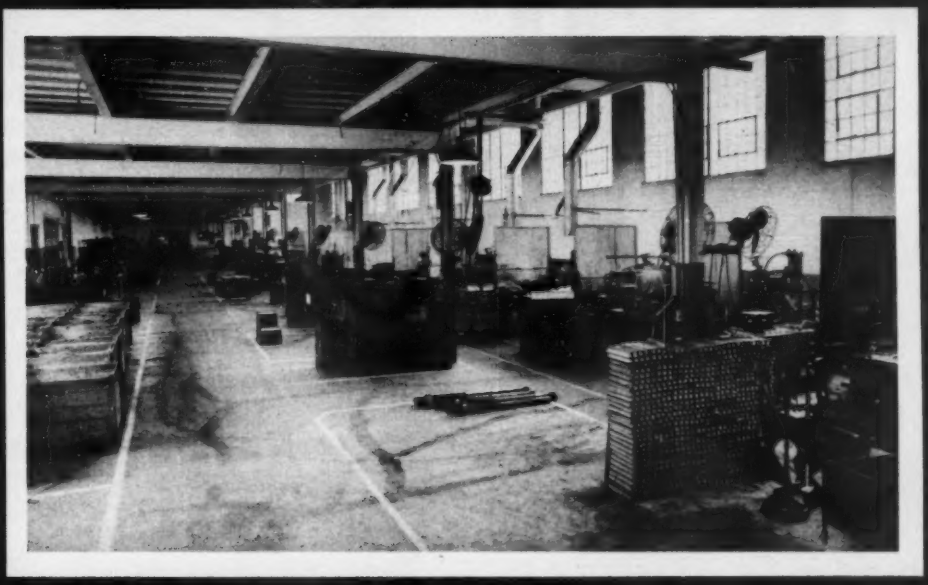

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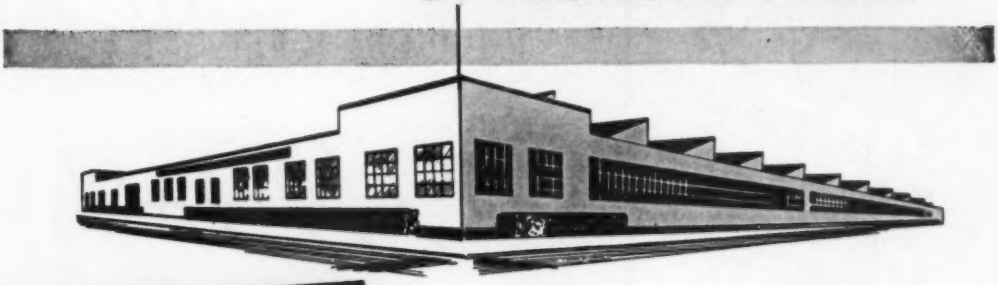

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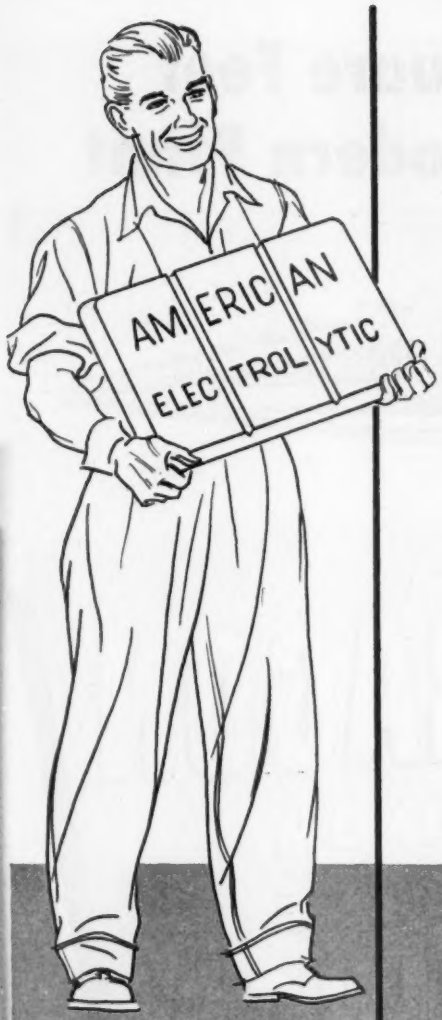

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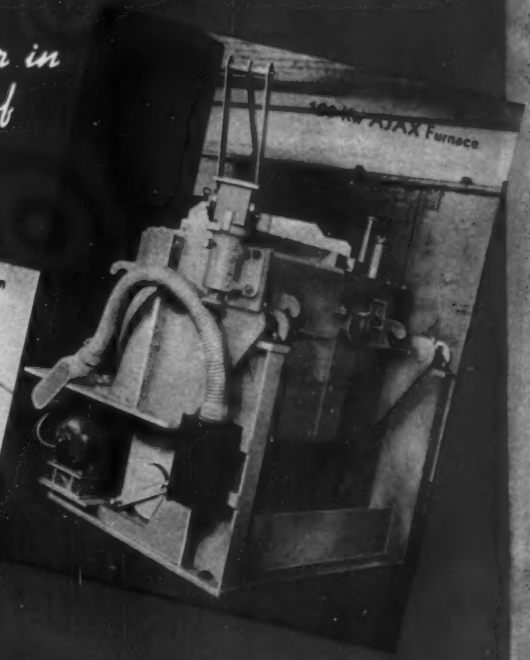
An Important Factor in Continuous Casting of Aluminum Rods

Casting machine, showing molten metal aluminum being led continuously from AJAX furnace.



AJAX Furnace

The picture at left above, taken at the Davenport, Iowa, plant of the Nichols Wire & Aluminum Co., is a graphic example of the way in which AJAX furnaces are helping in modern methods of production. Three AJAX furnaces, two as melting units and the third acting as a holding furnace, feed a continuous stream of molten aluminum at automatically controlled temperature into a rim cavity on the slowly revolving wheel of the Properzi machine which produces 3/8" aluminum wire directly from molten metal.

By this method scrap loss from pig to rod averages less than 1 pct., an extremely low figure, and all scrap is remelted, so that actually NO LOSS results.

The entire installation requires very little space. Working conditions are cleaner and cooler; the only heat is that generated within the melting metal itself.

Installations such as these illustrate the versatility of the AJAX furnace, which is doing so much to conserve manpower and reduce costs in these critical times.

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CASE HISTORIES FROM MT. VERNON FILES

. . . keys it from A to Z — from blueprint to finished product. For die casting is industry's cost-cutting method of producing accurate parts for thousands of applications.

Take the modern typewriter, for example. Few machines of comparable size and weight have to "stand the gaff" so well, but die casting supplies important components, with outstanding strength-weight ratios, that enable it to do a thorough job—***and stay on the job indefinitely.***

Two such parts are shown here: a top plate and a keyboard guard for Smith-Corona typewriters, cast from aluminum by Mount Vernon. Each is produced instantly, as the die closes, complete in every detail—holes, slots, notches, pads, channels, studs, ribs, counterbores as required. Both have perfect contour fit. Only a negligible amount of machining is necessary. Savings are thus substantial ***all along the line.***

Whatever your product, simple or intricate, consult with us. We have up-to-the-minute facilities for die casting aluminum and zinc, and a vast reservoir of experience. It's very possible we can key your production to increased output and lower unit costs . . . show you the way to improved products, too.

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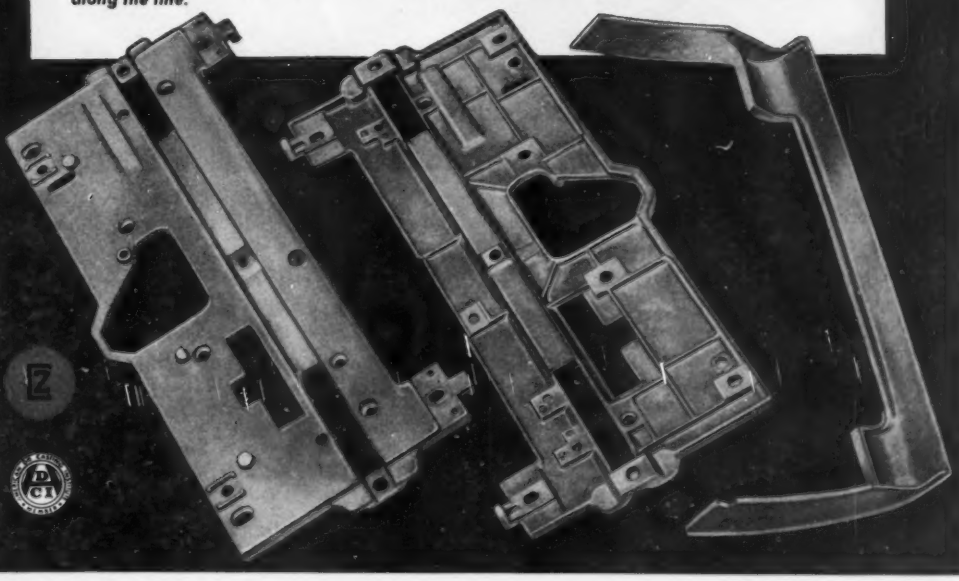
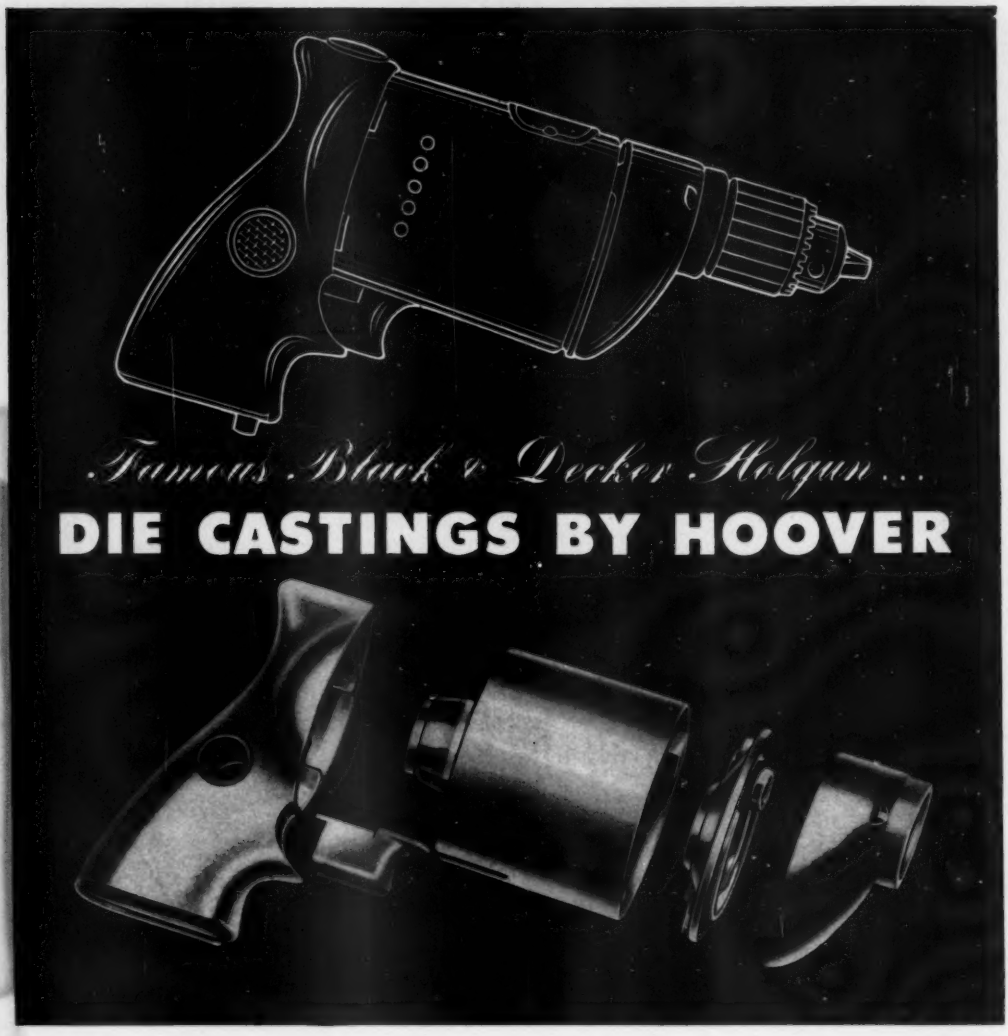




Famous Black & Decker Holgun . . .

DIE CASTINGS BY HOOVER

Black & Decker produce it, but Hoover die castings *help* to make the Holgun the world's most popular electric drill.

That famous "Pistol Grip and Trigger Switch" . . . that smooth, efficient, streamlined body . . . that strength-with-lightness of the Holgun . . . come from aluminum die castings by Hoover.

Many a good product has been made better . . . many a new product has had a head start . . . countless products have been made more efficient and their costs cut . . . with Hoover die castings of aluminum or zinc.

Hoover is a veteran of more than twenty-eight years in the die casting field, and has tucked a lot of knowledge up its sleeve in those years.

If you now use aluminum or zinc die castings, or if you think you could use them to advantage, ask a Hoover sales engineer to call and "talk it over."

THE HOOVER COMPANY
Die Casting Division . . . North Canton, Ohio

. . . HOOVER *Specialists in the Field of Die Castings*

1. COMBINATION CIGARETTE DISPENSER and coin bank, this handsome die cast novelty unit is die cast to achieve realistic effect.

Realistic Detail By Die Casting

2. A SELF-TAPPING SCREW and a rivet are used for assembling these two die cast parts which feed cigarettes to the dispensing aperture.

IN THE fall of 1950 the National Automatic Products Co., Cleveland, started production on a household novelty item with a utility value—a miniature combination cigarette dispenser and savings bank. It needs no coins to operate it; the cigarette is released by pressing a lever, and the bank is an additional utility feature.

The cabinet, 6¼ inches high, and two interior parts are die cast in a combination die so that a complete set of castings is produced simultaneously. Zinc alloy XXV (ASTM B86-46) is used.

The cabinet has a nickel plated, stamped steel back cover plate which is secured by a screw. The upper part of the back cover is hinged to give access to the cigarette compartment, while removal of the screw gives access to the savings compartment at the bottom.

Interior die cast components include the platform subassembly which incorporates the dispensing roller. A stamped, spring-mounted lever is attached to one side for actuation of the roller.

Machining is minimal, consisting of tapping two hollow-cored bosses on the cabinet and one on the platform, and drilling a small hole at one side of the cabinet for self-tapping screw.

The die casting process has been utilized to simplify the mounting and fastening of the the platform subassembly, Figure 2. This subassembly, with cigarette-dispensing roller and spring-mounted lever, is attached inside the cabinet by means of two cored holes on the platform flange which are slipped over two bosses on the cabinet wall, Figure 3, and fastened with screws and washers.

The large hollow boss by which the back cover plate is attached to the die cast platform, has a cored countersink to accommodate the countersink of the stamped back piece. One side of the roller is attached to the actuating lever by means of a rivet. Its other side is attached with a self-tapping screw. The roller, when actuated, pivots on this screw.

Another detail of the assembly deserves special notice. The window opening in the cabinet

wall is recessed .065 to serve as a "frame" for the transparent plastic pane. Cast integral in each corner of the recessed frame is a small boss to act as a rivet for permanently fastening the plastic window. Riveting is done with a specially developed spinning tool which must operate in an area with a radius of 3/32 inches. This spinning tool is a narrow shank mounted in a drill press.

During assembly of the window, the cabinet is placed in a fixture which has been fitted with plastic contact plates because these plastic surfaces have a certain resiliency when pressure is applied by the spinning tool. This avoids marring of the chrome plated surfaces.

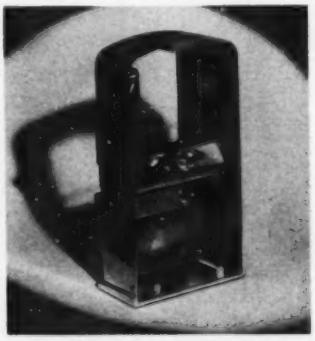
Operation of the cigarette dispenser is simple; pressure on the spring-mounted lever turns the roller holding a cigarette in its groove; the radius of the groove conforms to the diameter of a cigarette. As the roller is turned, the retaining face above the groove is tilted up to withhold the cigarette supply in the chamber. The spacing in relation to the front wall of the cabinet is such that upon release of the lever, another cigarette drops into the groove as the roller returns to its original position. Three curved bosses on the underside of the roller conform to the contour of the platform and thus serve as guides (or contact surfaces) as the roller is being turned.

A lustrous chrome plate gives the cabinet a jewel-like finish. Because the two interior die castings are visible through the window, they are bright zinc plated, thus serving the purpose of appearance while saving the cost of more expensive chrome plate.

Several other design features serving functional and decorative purposes are of interest. Three ejector bosses—two at the bottom and one at the top within the cabinet frame—were designed both for this purpose and for reinforcement. They also serve a third purpose, inasmuch as they are also a stop for the back cover plate, giving a neat, flush fit.

Small knobs across the width of the front surface add design interest as well as realistic detail by simulating the handles of commercial vending machines.

(Continued on Page 71)



3. LIKE ITS FULL-SIZED prototype, this miniature cigarette vendor utilizes chrome plated zinc die castings for eye-catching appeal.

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If you use non-ferrous metal castings, Advance Pressure Castings can help you make a better product.

From choice of alloy and finish—produced in our own foundry—through engineering by imaginative specialists for a new item or redesign of an old one, to machining of the finished casting in our modern tool room, Advance produces quality castings at low cost.

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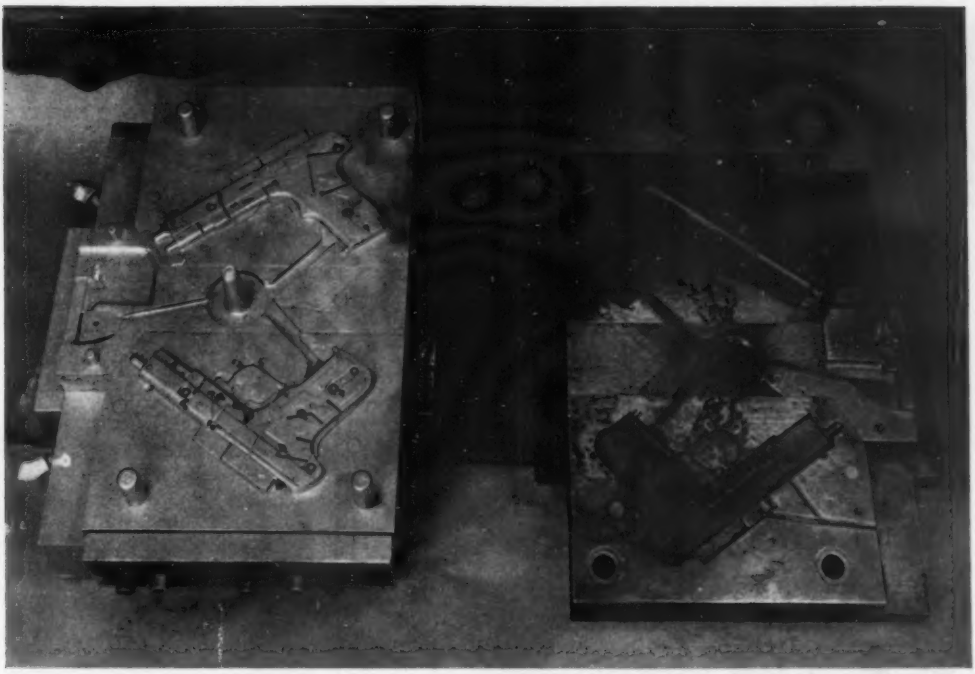


TEN MINUTES WAS REQUIRED for refinishing the half of a used die casting die, *above left*, using Hydro-Finish equipment. The other half of the die is shown *above right* for purposes of comparison.

TRACK AND LOADING ASSEMBLY are used to carry die parts into the Hydro-Finish machine, *right*. This provides a simple means for handling and processing heavy die blocks and mold parts.

Liquid Impact Blasting of Die Casting Dies*

By B. H. MARKS
Manager
Hydro-Finish Div., Pangborn Corp.

LIQUID abrasive blasting has been in use for some time as a method of final finishing of die casting dies. While it should be remembered that liquid blasting is by no means a cure-all, it does have a definite application in the die casting field.

Liquid blasting is a modified form of impact blasting whereby abrasive is suspended in a liquid, agitated to maintain suspension, and propelled through a blast gun by means of compressed air. Since the abrasive is suspended in a liquid (usually water and a corrosion inhibitor), particles much finer than those used in dry blast systems are practicable. Particle sizes are generally in the talcum powder range or finer.

Liquid abrasive blasting has two general applications. It can be used in a production line sequence, or in tool room production and maintenance work. Its uses in the tool room will be the subject of this article.

Some of the uses of liquid blasting in tool rooms and die maintenance shops are:

1. Removing and blending directional grinding lines.
2. Removing oxides and discolorations resulting from heat treating.
3. Improved lubrication retention.

* Based on a paper, "Manufacturing Applications of Liquid Impact Blasting," by B. H. Marks, presented at the 19th annual meeting of the American Society of Tool Engineers, March, 1951.

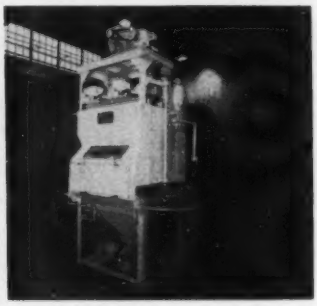
4. Preparation of surfaces for electroplating.
5. Mold and die maintenance.
6. General maintenance cleaning.

These are general classifications, and any application must be considered as a separate item.

It must be kept in mind that liquid blasting utilizes very fine abrasives, and is therefore a process for use on finished rather than raw materials. The finish obtained is a function of the finish before blasting. Liquid blasting will not make a rough ground piece smooth enough to do the work of a finish ground piece. A good die can be improved by this method, but it will do little for a badly finished, malfunctioning die. It should also be remembered that liquid blasting is not a tool for producing a given dimension. The die should be finished to dimension before blasting and then blasted with an abrasive fine enough to hold that dimension.

For tool room applications a manually operated cabinet is recommended since the work loads are not large and the primary interest is in the production of good finishes while eliminating tedious hand work.

In the making of a new die it is well to do as much polishing as possible before hardening, then liquid blast the die to remove and blend the grinding and directional polishing lines left on the surface. The blasting operation can improve the micro finish considerably; and the improved non-directional surface will reduce the resistance to the flow of metal in the die. Also, by liquid blasting it is possible to reach many places difficult to reach in hand polishing and much needed surface improvement is obtained on surfaces usually given only "a lick and a promise."



TWO ROTATING TABLES with work fixtures make this machine useful for both die maintenance and production finishing operations.

Dies can be blasted to remove the oxides formed during the hardening process. A Chicago die caster reported that it required approximately 16 man hours of labor to hand polish 16 small die inserts in his plant. The same pieces were processed in one hour by the liquid blast method. The inserts were used to produce a small serrated knob for a home appliance. The cav-

(Continued on Page 26)

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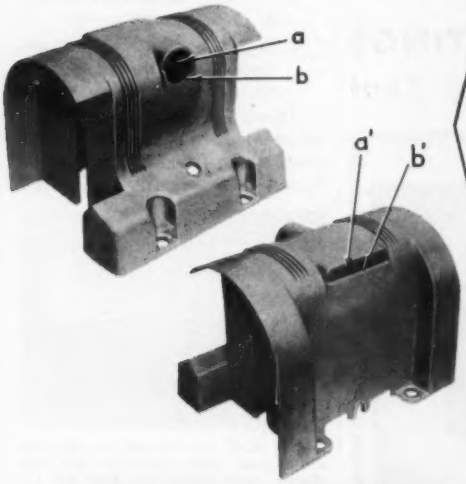
DO's and DON'Ts in DESIGNING ZINC and ALUMINUM DIE CASTINGS

examples by DOLLIN

PRINCIPLE: Costs can often be reduced by offsetting openings so that coring can be accomplished with fixed instead of movable cores.



EXAMPLE: the manufacturer's original design for this bench grinder housing called for uninterrupted edges around openings **a** and **a'**. To cut die casting costs, Dollin engineers recommended incorporating steps **b** and **b'**. This eliminated the need for movable die cores—made possible coring by fixed die members. **RESULT:** substantial savings in production costs for the manufacturer.

Dollin engineers will work with you on design refinements, recommending whatever changes will simplify the die casting operation, improve the soundness of the castings, or eliminate machining, finishing, or assembly operations. They have at their disposal extensive, modern facilities, and are thus free to adapt designs for lowest final cost.

Dollin can efficiently produce all commercial sizes of die castings—facilities include large plunger zinc machines, large and medium size cold chamber high pressure machines, and a separate small castings department (see examples at left). Write for estimates and engineering advice, at no obligation.

SPECIAL SMALL CASTINGS DEPARTMENT
For low die and casting costs: small single or double cavity dies—high speed automatic machines.

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ity was ¾ inches deep, ⅜ inches in diameter at the bottom and tapered to ½ inch diameter at the top. The many serrated grooves running from top to bottom made this piece difficult to polish by hand.

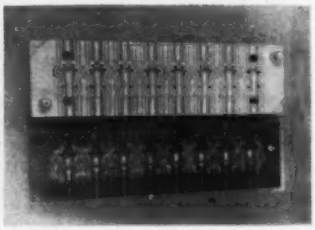
The report stated further that the die produced good hardware finished pieces almost immediately, whereas a normal hand polished cavity of this type required a long break-in time before producing good parts.

Surfaces which have been liquid blasted with fine abrasives contain many microscopic wells. A surface of this type has been found to hold lubrication very well. Liquid blasting also can improve the quality of hard chrome plating by removing grinding fuzz to make the plating adhere only to the base metal, smoothing out plating build-up around corners and sharp edges and accomplishing the same surface conditioning effects mentioned previously.

Maintenance of dies is of great importance in the die casting operation. The production superintendent of a large plant lists the following as advantages of liquid blasting:

1. It is a rapid method of cleaning.
2. Dimensional and contour changes are held to a minimum.
3. It leaves a non-directional finish.
4. Break-in time is reduced.
5. In many cases disassembly is unnecessary.
6. A more thorough inspection of the die parts after cleaning is possible.

There is nothing more disheartening than to see a once beautifully finished die in the hands of a cleaning room man



LIQUID BLAST has been used on this heat treated mold. Upper portion has been blast cleaned, lower section has been left uncleaned for comparison.

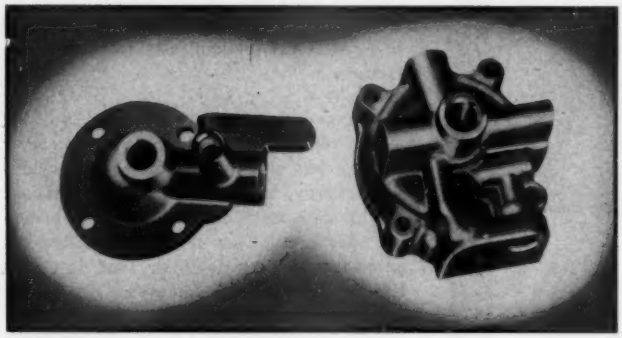
who attacks the problem of removing carbon from a ten micro inch surface with the first rasp or scraper available.

It is useless to specify a highly polished surface on a die if it cannot be maintained in cleaning. Liquid blasting can be of great aid in answering this requirement. Because of the fine abrasives used, dies can be cleaned repeatedly with a minimum of metal removal and maintenance of a finish equivalent to the original.

J. W. STUART APPOINTED REP.

The appointment of J. W. Stuart as eastern territory Machine Division sales representative has been announced by The Osborn Manufacturing Company. Mr. Stuart has been associated with the Foundry Industry since 1933.

These Accurate **DIE CASTINGS ARE** *"Everything That the Name Implies"*



Carburetor parts of aluminum alloy. At left is fuel valve body. Other part is a carburetor float bowl. These die castings are used on outboard motors.

Here again ACCURATE DIE CASTINGS were the perfect solution to the problems of close tolerance, strength, uniformity—AND PRICE.

We have the plant facilities, the experience and the skill to supply WHAT you want, WHEN you want it and at an interesting quotation.

We welcome inquiries. Let's get acquainted. Tell us your needs.

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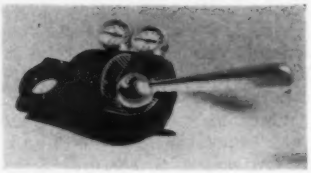
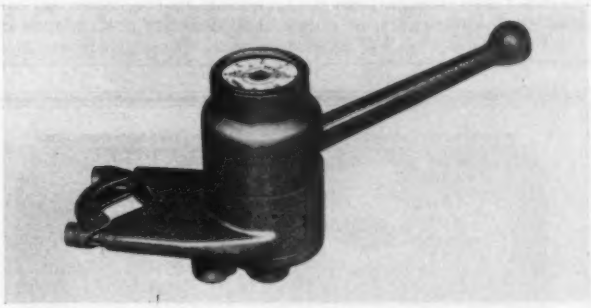


1. BEFORE REDESIGN. This previous model of the Bendix hand control valve included several die cast parts, but was less compact and cost more than the new design now in production.

Old Design . . . and new design use die castings

2. AFTER REDESIGN. Better appearance, together with functional and cost advantages, have been obtained by redesigning.



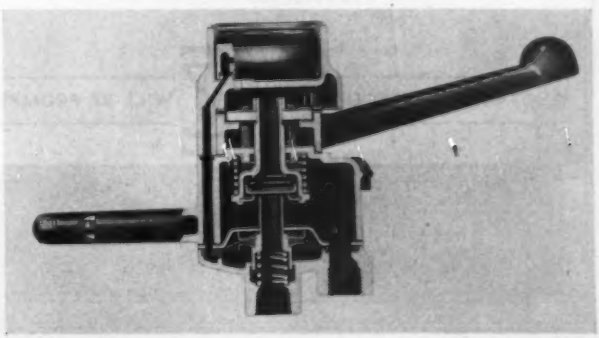
Stop-Off Core Gives Production Flexibility

MOST modern American trucks of medium to large size are now equipped with vacuum operated brakes and the same type of equipment is widely used also on trailers for trucking applications. It is also becoming common practice to provide an independent hand control valve in addition to the pedal operative valve on tractor-trailer combinations. Such an extra control affords added security and flexibility, especially on icy or slippery roads where skidding and jack-knifing are most likely to occur.

Bendix Products Division of Bendix Aviation Corporation long has made hand control valves as well as many other vacuum brake components and complete braking systems. In these, die castings are employed wherever they prove best adapted from an engineering and economic standpoint for the particular application. This applies, among other cases, to hand control valves. Figure 1 shows a valve unit that has been in production for several years. It incorporates zinc alloy die castings that serve their purpose well.

Recently it was concluded that

3. CORING FORMS virtually all recesses of the main housing, which is die cast in zinc. Vertical section through the assembled hand control unit shows all four die cast parts in correct relative position, along with mating components.



this valve should be redesigned to provide a more compact and better appearing unit in which a gage would be integrally housed or, where not wanted by the purchaser, would be eliminated and still adhere to the same basic design. In Figure 2 is shown the new design in the form that incorporates a gage and Figure 3 shows the same unit in vertical section.

From these illustrations, it is clear that appearance is much improved and that the unit is more compact. It is also sturdy and is adapted for quick attachment to any steering column from 1½ to 2 inches in diameter. The main body is closer to the column and takes up less space. Operation is by a hand lever that measures 7½ inches from its center of rotation to the edge of the hemispherical grip.

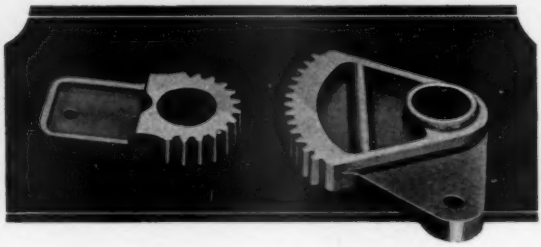
When a gage is required, it is housed in the upper die casting and does not protrude, as in the earlier design. If no gage is to be used, a casting without the extension and gage recess is substituted but the assembly is otherwise the same as before. In service, the gage is located just below the steering wheel, where easiest to see, yet is so well housed that injury is most unlikely.

Included in the design are four zinc alloy die castings. These are chosen because they are moderate in cost, are readily produced and are fully cored in the shapes required, so that very little machine work is needed. In addition, external surfaces are smooth and need no polishing or other machine work, except for flash removal, hence an inexpensive but enduring crackle finish suffices to yield the appearance needed without the extra operations that sand castings would require.

Zinc alloy is chosen because it combines good strength and high impact resistance with ease of casting and freedom from red rust besides insuring castings of requisite smoothness. Redressing and other expensive die repairs are avoided. Such machining of castings as is needed (chiefly drilling and tapping) is easily and rapidly done and involves only slight metal losses. Such economies make zinc alloy castings ideal for the purpose.

As Figure 2 indicates, the major die casting is the main housing in which the simple poppet valve assembly is placed centrally. This casting has a cored supporting bracket at one side and sections throughout are uniform in thickness (about 3/32 inch) making for soundness and ease in casting. Coring forms the main recess as well as smaller holes of which two, in the bracket portion, are cored to tapping size. As the cores are metal, of course, there are no sand inclusions and no cleaning or sealing of sand is required, as in many sand castings.

Both the top and bottom covers also are die cast and are



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DIE CASTING DIVISION
The Cleveland Hardware & Forging Co.
Established 1881
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NEW VICE PRESIDENT in charge of engineering and research at Eclipse Fuel Engineering Co., is Donald A. Campbell, above, formerly manager of the industrial division, Affiliated Gas Equipment, Inc.

held to the body by concealed screws, the joints being flat and having suitable gaskets. In the top cover designed for use with a gage, the upper recess is cored for the gage and that in the under side provides a clearance recess. Some smaller holes also are cored. When no gage is needed, the recess for it is eliminated, shortening the casting by the height of the recess and leaving the top of the casting slightly doomed.

In the lower half of the top cover is a cored side opening through which the die cast operating lever projects. This lever is an extension from a generally cylindrical portion that seats between rings of steel. These form bearing faces that minimize wear. One ring mates with a centering boss in the body casting. The operating lever has a U-shape section that affords stiffness yet requires a mimimum of metal.

Inside the cylindrical portion is a ledge or lip the face of which forms a helix cam mating with a plate on a hollow threaded tube flanged at a lower level. Thus, when the operating lever and the ring are turned, the mating tubular part, is raised or lowered, opening or closing the vacuum control is a hardened steel ring which valve. On the face of the cam virtually eliminates wear.

The fourth die cast component is the lower or bottom cover. It includes bosses cored for pipe taps where connections to the brake system and vacuum source are made. A central recess is also cored for a hub and valve spring, the hub being attached to a rubber diaphram. The latter extends outward and is clamped between the lower cover and a dished steel plate when the bottom casting is attached to the main casting.

Actually, all the die castings are very simple parts and are easily and quickly finished. As they are produced rapidly and so close to size that very little machine work is needed, their cost is minimized. This, of course, was one primary reason for making the parts in die cast form.

Since the parts not die cast are also well adapted to rapid and economical production, and assembly too is quite simple and rapid, total costs are moderate. As die castings from the major components, however, they are quite properly credited with effecting the greatest economies.

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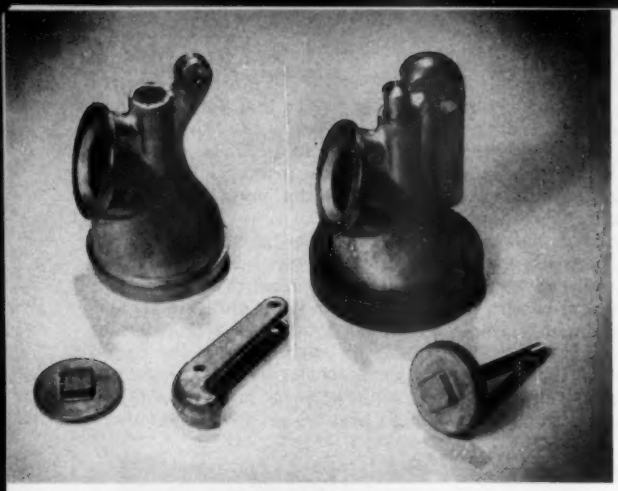
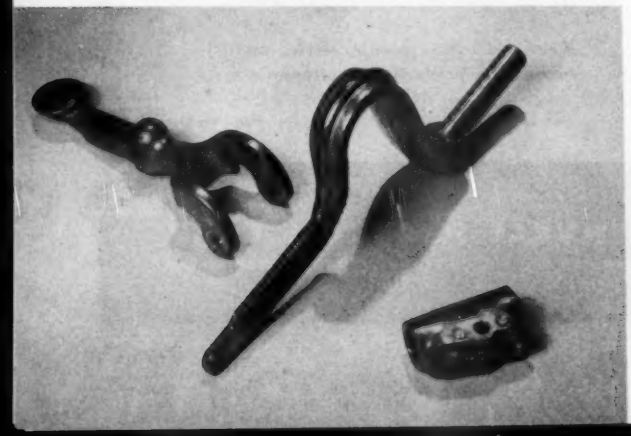
SAFETY



2. NON-CORRODING VALVE housing die cast in zinc alloy, is shown assembled, *right above*. All three large, intersecting passages are cored and require no machining.

3. PROPER BALANCE DURING CARRYING is obtained by this well-shaped die cast handle. Oval section and inherent strength of zinc alloy give adequate strength.



4. TO OBTAIN APPROVAL from Underwriters and insurance agencies, highest type of performance is required. This naturally makes it essential that only the most dependable materials be used, such as these die cast parts.

SAFETY equipment approved by the Underwriters Laboratories, Inc., and by the Associated Factory Mutual Fire Insurance Companies must meet the highest standards of performance and construction.

The line of safety containers for flammable and combustible materials manufactured by The Protectoseal Company, Chicago, meets the rigid requirements of all insurance and fire authorities. In equipment of this type, subjected to 100 percent testing, no questionable materials or fabricating methods can be employed.

The problem of combining complete dependability with low cost production has caused Protectoseal to explore the most up-to-date methods.

For example, the steel body of the supply can, Figure 1, and other metal containers of this type are electric seam welded

ASSURED

1. FOR MORE THAN TEN YEARS, the Protectoseal Corporation has been using die cast parts on its various safety containers, of which this supply can for liquid fuel is an outstanding example.

for complete, positive closure; a specially designed, double concentric cylinder of perforated sheet brass inside the base of the spout makes a secure, puncture-proof fire baffle; and the use of zinc alloy die castings for the handle, valve housings, levers and other operating parts provides strength, stability and intricate shapes at low cost.

Protectoseal has used zinc die castings for more than ten years in building fireproof containers. Developed originally for safe fueling of the small cars used by railroad maintenance crews, this type of container has since found wide usage throughout industry, and variations of it have been introduced for specialized purposes. In many of these models, die cast covers, valves, levers or linkages are used.

Three die castings go into the valve housing by which the flexible spout is attached to the safety can. These parts, shown assembled and disassembled in Figure 2, do not rust or corrode in contact with liquids, and they represent the most economical way of installing a valving mechanism.

Although the die parting lies vertically around the largest perimeter of the valve housing, three moving cores in the die create the intersecting internal passages so accurately and smoothly that no machining of the inside surfaces is needed.

The brass valve stem rides directly inside the cored hole at the top, and the zinc alloy provides an excellent bearing surface without bushing or sleeve. The leather gasket rests against an accurately formed valve seat in the lower cored hole, and the flexible hose is secured to the flange around the third opening. Due to the angle, small size and location of the screw holes for attaching the hose, they are drilled and tapped, rather than cored.

Smooth Contour on Handle

Even on such strictly functional equipment as this, appearance plays an important part. Surfaces need to be smooth and well-contoured, there should be no rough edges to come into contact with the hand, and they should be easy to paint.

The handle die casting, Figure 3, is an example of a gracefully shaped piece, designed for proper balance while lifting the container. This part has high physical strength, and has been designed with an oval cross section both for extra reinforcement and for more comfortable hand grip.

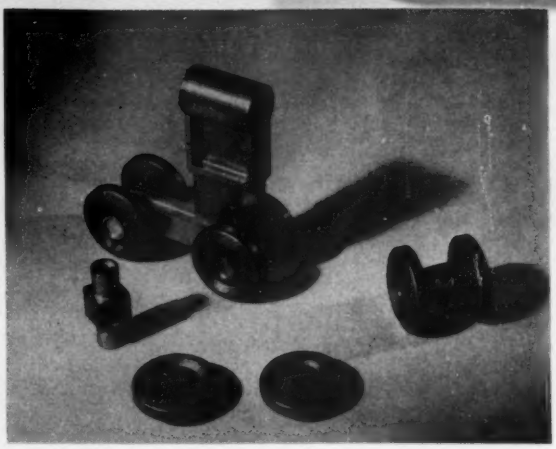
All holes are cored in this, including the slot through which the operating trigger works, and the cross holes in which the vacuum breaker die casting pivots.

This type of handle construction could readily be adapted for a wide variety of portable equipment in which a handle needs to be combined with some sort of latch, lever, switch or operating mechanism which could be mounted onto the handle die casting.

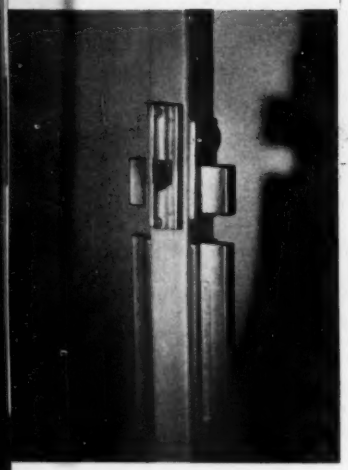
Of course, dependability is one of the prime features of this type of product, and here the inherent physical strength, impact resistance and corrosion resistance of the die cast zinc alloy makes a contribution to the serviceability of the safety containers.

From a production standpoint, die castings simplify assembly, virtually eliminate machining or other secondary operations and have such a high degree of accuracy that uniformity from part to part is assured.

Thus, all requirements of this critical equipment is satisfied by using important die cast components and fittings: dependability, low cost and production ease.



SMOOTH, QUIET OPERATION of the FolDoor, *left*, depends upon the trolley block, *above*, which is constructed of powdered metal rollers held on a die cast zinc trolley block. Axles for the wheels are formed by bosses on the die casting crimped over at the ends to produce a permanent assembly. This economical type of assembly is also highly satisfactory for other reasons, since it results in very quiet operation.



TO FIT IN NARROW SPACE too small for standard locking mechanisms, the latch and lock assembly, *left*, have been specially designed. Decorative handles and internal working parts are die cast in zinc.

SPECIAL HARDWARE FOR FOLDING DOOR

The hardware industry has for many years been a major consumer of die castings. Among the reasons for this acceptance have been large quantity available at low cost, ability to fabricate intricate shapes and designs and ease of finishing.

The Holcomb & Hoke Mfg. Co., Indianapolis, found in die casting the answer to several problems that came up in connection with its product, the FolDoor. The FolDoor is a folding door consisting of a steel framework covered with a vinyl-coated fabric. In operation the door rides on an over-head trolley system, the door folding into pleats as it is closed.

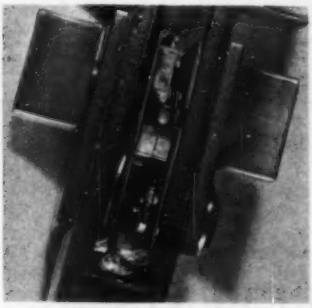
Hardware for the FolDoor was originally specified as sand cast brass, but the company soon discovered that savings as high as 30 per cent could be effected by utilizing the die casting process. When it was decided to add a lock to the door assembly, still another problem was encountered. No com-

mercially available lock could be found that would fit in the restricted space in the door post. Company engineers therefore designed a special lock, incorporating die castings in order to achieve the necessary production at a reasonable cost.

Reject Rate Lowered

Handles for the FolDoor consist of 5½ inch T-shaped sections with slightly concave sides. The brass sand casting of this part required a milling operation on the retaining lugs, drilling and tapping of the set screw hole on one end and rough grinding and polishing in preparation for plating. In addition, the company found that dimensional variations in the sand cast parts resulted in a large percentage of rejects.

A cost analysis revealed that



The latch and lock mechanism, above, is fairly simple in operation. The knobs on either side of the FolDoor turn levers which lift the latch in the door over the keeper in the door jamb. The lock, when engaged by a key, holds down the lever to prevent its disengagement.

finished die castings would be less expensive than the rough sand cast parts. The change was made and benefits other than a reduction in machining were realized. The uniform cross-section of the die cast handle gives a better fit against the door post, and a recessed panel with the company name is cast integrally with the piece. The company now buys the handles with the lugs broached, the cored set screw hole tapped and the piece finished in a satin chrome plate.

Although not a visible part in the assembly, the trolley mechanism for obvious reasons must function smoothly and dependably. Two different die cast zinc trolley blocks are used on the door, the one at the door post having four wheels and the intermediate blocks with two.

Principle savings on these parts derived from the elimination of separate axles for the powdered metal wheels. A projection is cast on the trolley block with a 3/64 inch depression in one end. After the wheel is slipped over the projection, the depressed end of the projection is upset, holding the wheel securely. The ductility of the die cast zinc alloy here offers a permanent fastening method.

Further savings were effected by the elimination of the drilling and face grinding necessary on the sand cast parts.

Special Lock Developed

The lock and latch parts are die cast of zinc alloy, as are the other die castings used on the FolDoor. The releasing Mechanism is installed in the door post,

(Continued on Page 70)

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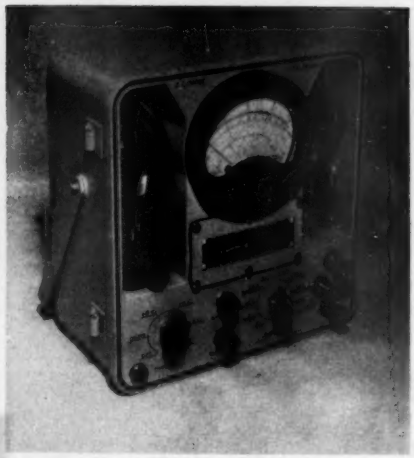
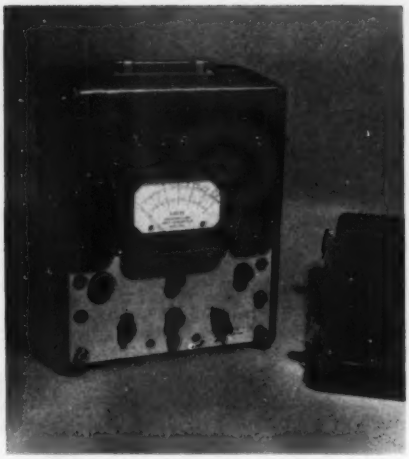


1. MILITARY CONTRACT under which this AC-DC vacuum tube voltmeter was produced sets forth strict performance specifications, but leaves the choice of materials and fabricating methods to the manufacturer. In this instance, an aluminum die casting has been found best and most economical for the major structural component.



2. FROM THE 23 POUNDS weighed by the prototype sand cast unit on which bids were submitted, above, weight has been reduced to 13½ pounds due to the combination of die cast frame and stamped aluminum covers. Extensive machining required for the sand cast unit has been almost entirely eliminated.

DIE CASTINGS MEET REQUIREMENTS FOR SIGNAL CORPS CONTRACT

By J. ROSS
Chief Engineer
Specialty Engineering Div.,
Specialty Assembling & Packing Co., Inc.

MILITARY contracts obtained on a development and production basis require the manufacturer to meet rigid performance specifications but permit him to design and select components as dictated by cost and production considerations.

We are currently manufacturing for the U. S. Army Signal Corps, on this basis, a piece of test equipment identified as the Multimeter TS-505/U. Our experience in developing the production model of this device from the original prototype on which the bid was submitted, proves that it is entirely practical to employ mass production techniques, even for limited quantities.

In this instance, the original Signal Corps order called for 3,000 units, and since future contracts could not be predicted, it was necessary to amortize all tooling and development costs over this relatively small quantity.

The original model made available for purposes of bidding had a bulky sand cast mounting frame, weighed 23 pounds, required an excessive amount of machining and involved a cost many times that of the method of farbication we finally chose.

Our preliminary investigation indicated that either a stamped, drawn and welded assembly or an aluminum die casting could be utilized for the important front cover upon which most subassemblies are mounted; our job then was to make a cost analysis of the two methods, since either one would produce components having the needed structural and design characteristics.

Among the specifications to be met were: 1) a weight limit of 15 pounds for portability, 2) complete water-tightness, 3) resistance to humidity, corrosion,

fungus and other severe conditions of exposure, 4) shock resistance. These, of course, were in addition to the electrical and functional requirements which cannot be considered here.

We found that a front cover, die cast in aluminum alloy No. 13, could be manufactured at a cost approximately one-third that of a stamped cover having two drawn cups welded in position. This cost comparison represents finished piece price and does not take into account additional savings derived from fitting and sealing the cover, adding flanges and fastening devices—all of which add to the total cost and were incorporated into the design of the die casting at no extra cost.

For example, to make the case entirely waterproof (the units are tested by being submerged three feet under water for two hours.) It is necessary to have a rubber seal around the edge. With very little extra tool cost, it has been possible to core a groove on both front and rear surfaces so that the rubber sealing rings are positively located and held. An aluminum stamped front panel would not have lent itself to such a simple and inexpensive solution.

Engraving Costs Saved

Or consider another feature of the die cast front cover—this piece has about 130 letters and numerals on its front face for dials, indicators, etc. Cost of engraving these characters runs about two cents per letter, whereas for a total additional tool cost of about $200, all letters are formed integral with the die casting. This compares to a cost of $7800.00 for a run of 3000 units. Raised lettering has been utilized because this can be engraved into the die with the least cost. After the die casting is painted, the lettering is accentuated by rolling black paint onto the raised surfaces, making them permanently legible.

Whether stamped or die cast, aluminum would have been selected as the material. The lighter weight and high strength of this metal makes it well suited for portable equipment which is subjected to rough usage.

The finish to be applied has been fully specified by the government and consists of anodizing, zinc chromate primer and a one-coat baked enamel. The inner surfaces receive a coating of moisture-proof lacquer to prevent mildewing and fungus growth.

The die caster has been able to provide parts which are almost ready for assembly as re-

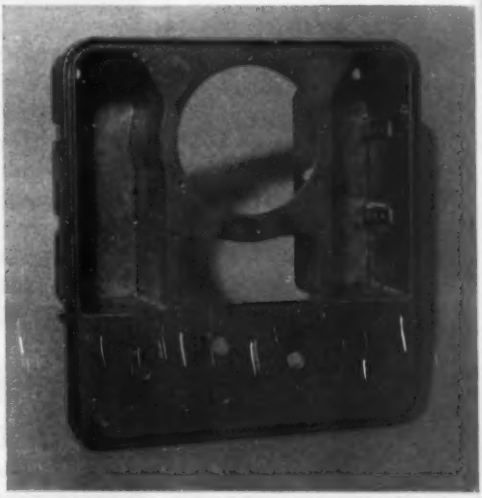
MULTIMETER MEASURES AC AND DC CURRENT AS WELL AS OHMS RESISTANCE

The Multimeter TS-505/U is a general purpose AC-DC vacuum tube voltmeter. It is capable of measuring AC and DC voltages and resistance in ohms all in one self-contained unit.

There are nine DC voltage ranges for measurements from 0 to 1000 volts, seven AC voltage ranges for measurements from 0 to 200 volts and seven resistance ranges for measurements of resistance from one ohm to 1000 megohms.

The enormous versatility of this equipment is further demonstrated by its capacity for measuring AC voltage alternating at from 30 cycles per second to 500,000,000 cycles per second. Within the Multimeter's function of resistance measurements its ability to measure resistances up to one billion ohms makes it an invaluable aid to measuring insulation resistance.

(The above description of the function of the Electronic Multimeter has been made possible through the kind cooperation of Mr. J. Kaplan, electronics project engineer on the above referenced project.)



3. SAVINGS AMOUNTING TO $7600 have been made on the lettering and numerals appearing on the face of this instrument. Additional tool cost for engraving these into the die came to $200, but the cost of engraving them into each of the 3000 production stampings or sand castings would have totaled $7800.

ceived. The only machining necessary consists of drilling and tapping of various holes for mounting the electronic system and sub-assemblies.

The shape of the part which makes it more expensive to stamp, also has introduced certain problems for the die caster. The front cover, Figure 2, consists of a flat plane on the rear of which are two deep "wells." These recesses have a tendency to shrink over the cores and bind the casting into the cavity making ejection a problem. The die caster has overcome this by machining a very slight undercut into the cover half of the die, so slight as to be almost invisible to the eye, but large enough to break the casting away from the ejector half and release it from the cores.

The depth of these two recesses also causes some slight warping of the piece so that it is

(Continued on Page 60)

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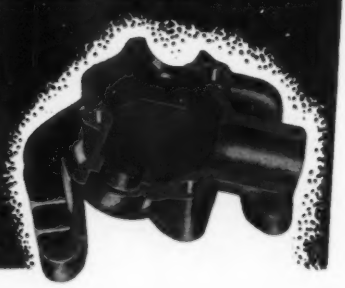

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FINISHING DIE CASTINGS

A SECTION DEVOTED TO THE FINISHING PROCESSES

MACHINING—Most die castings require some machining operations. In this section will be found information to aid in planning and selecting the proper method and equipment for these operations.

ASSEMBLING—Die castings are generally assembled components. This section includes information on fastenings and methods for mass production assembly operations.

SURFACE FINISHING—Most die castings receive some type of surface finish such as plating, organic coating, anodic coating or chemical coating. This section contains information on the methods, processes and equipment used for the various surface treatments on the die casting alloys.

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PRODUCTION CLINIC
for finishing die castings

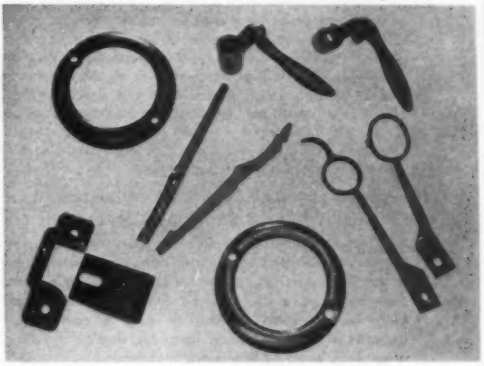
A monthly digest of current technical progress selected and prepared by the editorial staff of DIE CASTINGS. This section is devoted to finishing processes for all types of die castings, and is written specifically for the benefit of the production man.

BARREL FINISHING OF DIE CASTINGS:
a survey of materials, methods and equipment

FOR THOUSANDS OF TONS of small to medium sized die castings produced each year, barrel finishing represents the most economical method for removing or blending flash, cutting down, surface conditioning or preparing for subsequent surface coatings.

This bulk finishing technique is well-suited to the large quantities in which die castings are produced; the saving in labor and secondary operations which is one of the prime advantages of the die casting process is sometimes dissipated by the manual processing of small parts.

Because of the growing interest in barrel finishing methods, an attempt has been made by the editors of DIE CASTINGS to bring together here some of the current thinking and experimental data obtained from processors, manufacturers of barrel finishing equipment, and the recent literature.



UNLIMITED RANGE OF SIZES AND SHAPES which can be successfully barrel finished makes this an especially effective way for the bulk processing of die cast components. Small, complex shapes, difficult and expensive to deburr, polish or color manually, lend themselves readily to barrel treatment.

Nomenclature and Terms

This task has not been easy due to a lack of common definitions, disagreement on both theory and practice, and wide variations in both the materials and processing cycles employed. To simplify the problem a few broad definitions have been used which may or may not be acceptable to all parties concerned but which will, at least, help to explain the material contained here.

As observed by one manufacturer, "It is our opinion that one of the major causes of confusion in this field is the failure of the group interested in it to set up a glossary of terms describing the various operations and materials used. For instance, you use the term tumbling to cover the whole field as well as individual operations such as cutting down and burnishing.

". . . We believe that the term barrel finishing is a more suitable one to cover all barrel operations. Abrasive or cutting down operations should be designated by the terms deburring, deflashing, abrasive tumbling or abrasive rolling. Such a term would indicate that metal was removed from the parts and that no high degree of surface finish was to be produced. Operations where metal is not removed but the surface appearance definitely improved by increasing its reflectivity, could be called abrasive burnishing or ball burnishing, depending upon whether stones or hardened steel balls or shapes were used in processing."

Thus, in general, this discussion will use the terms, grinding, polishing or cutting down to refer to metal removal comparable to that accomplished by

an abrasive belt or polishing wheel. Description of the degree of cutting or the final surface character will be used, but no attempt can be made to classify surfaces according to microinch finishes.

Likewise the terms burnishing or coloring will be used where the process results in some cold working of the surface for increased reflectivity without removing metal. This is a particularly significant phase of barrel finishing die castings preliminary to electroplating because of the tendency to close off microporosity on the surface.

With certain operating cycles, also, both a cutting and a burnishing action are reported to be achieved.

Materials and Equipment

Before dealing with barreling additions—which are the crux of close finish control—the types of barrels will be discussed. There are two main patterns of barrels, open and closed: open barrels rotate on an inclined axis and closed ones on a horizontal axis. It is also desirable to distinguish between closed barrels according to whether diameter does or does not exceed the axial length, and also according to the number of separate compartments.

Tumbling barrels also differ in method of drive, using geared, variable speed, pulley or chain and sprocket. Some have provisions for braking or inching the barrel into position. Numerous safety and mechanical handling devices are also available as standard or accessory equipment. If parts are to be racked, such as large, heavy-sided castings, it is desirable to be able to reverse the direction of rotation. Some models have more than one door for easier access is racking.

Barrels used for processing die cast parts are constructed from steel and are usually lined with wood or synthetic rubber. At least two concerns are reported to have experimented with patterned sheet metal linings embossed with alternate raised and depressed sections to modify movement of the charge within the barrel.

Special Cycle Must Be Set Up For Each Job

The choice of equipment and materials for the barrel finishing operation is largely empirical, and although a large body of scientific study has been developed, the infinite number of possible combinations and variations makes the setting up of a process cycle a matter for the expert. Firms that manufacture barrels or materials, possess extensive experience with all types of parts and finishes and maintain engineering services. The company planning to attempt barrel finishing would do well to consult with these firms, since the attempt to set

PRODUCING A SMOOTH SURFACE

1. What is the effect of barrel finishing processes on small surface blemishes and porosity?

   ANSWER: Burnishing or coloring in a barrel can improve the surface condition, but is a poor cure. The original cause of the trouble should be corrected. However, there is a definite cold working action on the surface and small blemishes or porosity can be blended into a smooth, reflective surface suitable as a final finish or as a basis for electroplating. Distinction should be made between barrel operations for grinding and polishing, which remove metal, but do not close up porosity, and burnishing which peens, rubs and flows metal surface. Many die cast parts are barrel finished specifically for this purpose—to close up porosity and yield a sound surface for plating. Choice of proper die lubricant in the die casting process can also affect the success or failure of burnishing to a high lustre.

2. Can polishing or burnishing be accomplished at the same time as flash is being removed?

   This, again, depends upon the part, the choice of materials and the degree of polish or burnishing. In some cases, it is reported, it has been possible to deflash, lightly polish and burnish at the same time by using a special acid compound, and in other cases, the use of proper abrasive media can give a combination. However, this depends in both instances, upon the degree of reflectivity required and in general, two operations are recommended.

3. Can tolerances of die cast parts be maintained during barrel finishing?

   Along with the maintenance of low micro inch finishes, it can be said that extremely close dimensional tolerances can be maintained. Some operators suggest that tolerances can be held on only one surface, and the rest of the surfaces may not be held. The extra action of tumbling on corners, edges and sharply exposed areas is also a qualifying factor. In most cases, common commercial tolerances can be held.

4. Which shapes are easiest to barrel finish?

   ANSWER: The ideal shape, which rarely occurs, is a perfect sphere. Simple shapes with well-balanced mass and weight distribution, minimum holes and slots to trap media—are desirable. Recesses and cored openings of varying size complicate the job of selecting size of medium which will not lodge. Example given of good shape for barrel treatment is tear-shaped faucet handle. Light parts are easier than heavy, bulky parts.

5. What degree of surface finish can be achieved?

   ANSWER: Unlimited. Range extends from satin matte to mirror finish. Larger media, faster-cutting stones and compounds having minimum lubricating ability tend to produce dull "scratchy surfaces." Small stones, stones which tend to become smooth in use, soft stones, or compounds having high lubricating qualities produce lustrous surfaces. Barrel speed, water content and duration also influence degree of surface finish.

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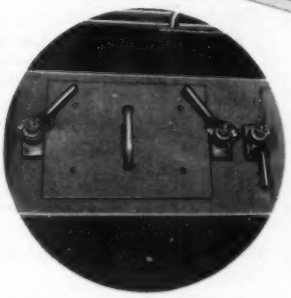
MODEL 48-2



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New Grav-i-Flo machines are available in three sizes: cylinder size 36" x 40" dia.; 48" x 40" dia.; and 66" x 40" dia. Compartments furnished ½" plate unlined or ¼" plate rubber lined. Cam lock doors have manual release safety stops. Reduced voltage control on magnetic starter. Lever or push-button switch. Limit switch on safety guard. 220-440 volt, 3 phase, 60 cycle motor with magnetic brake. Water attachment with hose. Counterbalanced safety guard. Hoist pan has tubular yoke with manually operated lock. All standard equipment. Variable speed drive and timer controls optional.

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GRAV-I-FLO TUMBLING

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up a system without expert advice might well result in duplication of experimental effort, waste of time and poor results.

FLASH AT PARTING LINES and around cores and slides is a characteristic of all die castings. One effective way to remove flash, especially when located at edges and on exposed surfaces, is to give a short cycle in a barrel rotating at relatively low speed.

It should be pointed out here that no single pattern or system can be applied to all tumbling problems. Only the broadest generalizations can be given here, since each part to be processed represents an individual and unique set of conditions. Information contained here is intended only for general guidance and review of possibilities.

Additions used in barrel finishing are the media, the compound and, in the case of wet processing, a liquid. Selection of these, along with establishment of other variables such as barrel speed and time cycle, must be based upon results to be obtained.

Media Choice

Natural Abrasive Media. A group of mined materials ranging generally from limestone to granite chips have considerable variety of cutting or burnishing action and can be used for rough polishing to coloring.

Synthetic Abrasive Media. Fused aluminum oxide lumps in larger sizes are suitable for rapid cutting down, while smaller sizes are capable of producing partially burnished surfaces. Other synthetics consisting of alumina or carborundum with softer binder have less abrasive action, slower action and permit smoother finishes.

Steel Balls and Shapes. Burnishing to a high lustre can be accomplished with balls that have a tendency to cold work the surface. To modify action of the media to contact all surfaces of irregular shapes, variations such as eggs, balcones or round ended pins may be introduced.

Organic Media. Other nonabrasive media, sometimes identified by the term "carriers" include such materials as wooden pegs, macerated corn cobs, ivory chips, hardened leather, felt strips or nut shells. In most cases, these are used in combination with abrasive compounds which coat their surfaces, but actually perform no cutting action by themselves.

Compounds are used with the media in some cutting-down operations. They serve to lubricate the action of the media and prevent too-rapid cutting of the flat surfaces, to keep the parts clean, to maintain the cutting

FLASH AND BURR REMOVAL

1. Can flash removal be accomplished successfully by barrel methods?

   ANSWER: In most cases, light flash can be removed by tumbling, although this must be qualified by the location, thickness and the quality of final surface to be achieved. Frequently, the flash removal can also include a second operation such as polishing or cutting down without additional cost. Flash thicknesses up to 0.040 have been removed when flash is in an exposed position. Complex shapes, external threads, flash in recessed areas or strict dimensional control may prevent successful flash removal. Attempt to remove extremely heavy flash may prolong cutting action beyond tolerance for entire piece.

2. Should flash be die-trimmed first? If so, how close?

   ANSWER: Whenever possible, flash should be removed with a trim die to leave only the root of the flash for final barrel action. Recommended practice is to leave no more than 0.002 - 0.004 for barrel removal. If quality finish is desired, then flash should be shaved as close as the shape of the part permits. In some cases where flash is excessively heavy, it is desirable to hand polish before tumbling. Concave surfaces need closer flash trim than convex surfaces.

3. Does position of flash affect removability?

   ANSWER: Position of flash determines largely whether it can be removed. If flash is in protected area or in the center of a flat area it is more difficult to remove than when located on edge or in exposed location.

4. Will barrel operation clean out flashed-over openings?

   ANSWER: Most authorities consider removal of flash from openings too difficult and generally unlikely. However, if flash is thin and loosely held, and position of flashed-over opening is favorable, this can be accomplished. Recommendation has been for use of sized media for this purpose.

5. What cycles, speeds and materials are recommended for flash removal?

   ANSWER: Each piece requires an individual plan depending upon its size, alloy, shape and finish requirements. Common die cast materials are relatively soft and usually are tumbled at barrel speeds in the range of 12 - 14 rpm as compared with 18 - 20 for iron and steel. One manufacturer reports speeds of 30 rpm with a tilting barrel which, with complex action of the mass, provides more rapid cutting. Also, due to softness, heavier barrel loads up to 75 per cent capacity are used to shorten length of "slide" and therefore reduce cutting action, as compared with long "slide" when barrel is 50 per cent filled. Greater water content is also common practice to slow down cutting action and protect die cast surfaces from nicking and peening. Faster speeds, larger stones, lower water content, harsher abrasives remove flash faster, generally produce dull surface and result in more severe over-all cutting action. Caution is recommended where large, flat areas are concerned.

action of abrasive media by removing the glaze formed from the cutting operation and in the case of abrasive compounds, to aid in removing metal from the part. Where rapid cut-down is desired, some abrasive media can be used without compounds.

In burnishing the compound has only lubricating, impact-softening and cleaning purposes. In all forms of barrel finishing, care must be taken when finishing die castings to avoid chemicals which will corrode the part. If a steel or iron medium is used, it will also be necessary for the compound to contain a rust preventive chemical. Manufacturers of barrels, media and compounds are in the best position to advise on the selection of a compound for a given application.

In wet barrel finishing, it is necessary to add a liquid of some type, usually water and a wetting or cleaning agent. If hard

ADVICE CONCERNING A SPECIFIC cycle and combination of barrel additions should be obtained from companies who have engineering departments set up for running tests and experimental batches.

water is used, a water softener is often added. Many of the compounds on the market have water-softening properties.

Auxiliary equipment, mainly for use in handling the materials used in tumbling operations, is available from many of the barrel manufacturers. These items, designed especially for use with specific equipment, can be of great aid in setting up and maintaining high production schedules.

Nature of the Action

The movements of the charge within the barrel are governed

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NEW! Murco TUMBLING BARREL

7½ H.P. CONSTANT SPEED *and* 7½ H.P. VARIABLE SPEED

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Here are new, completely modern tumbling barrels with all the features demanded by up - to - the - minute operators who need high production, trouble-free tumbling equipment. Six newly designed models of MURCO Tumbling Barrels have been developed by practical operators who, from years of experience, know the faults of ordinary barrels. The new MURCO Barrels are compact, occupy minimum floor space, are built lower than ordinary barrels to make loading easy, and reduce work fatigue.

MODEL	MVS-60-2	MSS-60-2
SIZE	36" x 60"	36" x 60"
MOTOR	7½ HP, 220/440 V. 1750 RPM, 3 ph. 60 cycle	7½ HP, 220/440 V. 1750 RPM, 3 ph. 60 cycle
SPEED	Variable 8-25 RPM	Constant 25 RPM
OVERALL LENGTH	92¼"	92¼"
OVERALL WIDTH	63-3/16"	59-11/16
OVERALL HEIGHT	69-9/16"	69-9/16
COMPARTMENTS	2	2
ACROSS FLATS	36"	36"
COMPARTMENT LENGTH EACH	29½"	29½"
COMPARTMENT CAPACITY EACH	18 cu. ft.	18 cu. ft.
LOAD PER COMPARTMENT	2500 lbs.	2500 lbs.
DOOR SIZE	13" x 21"	13" x 21"
DOOR CONSTRUCTION	Cast Alum. Neoprene Faced	Cast Alum. Neoprene Faced
BARREL ENDS	½" thick	½" thick
CENTER PLATE	½" thick	½" thick
BARREL WALLS	5/16" thick	5/16" thick
BRAKE	Hydraulic Foot Operated	Hydraulic Foot Operated
MOTOR CONTROL	Magnetic Reversing	Magnetic Reversing
GUARD	Closed Bar	Closed Bar
DRIVE	Chain	Chain

Here is the Model MSS 60-2 Constant Speed Barrel operated at 25 RPM single speed.

The Model MVS 60-2 Variable Speed Barrel is essentially the same except for the drive mechanism.

SAMPLE PARTS PROCESSED

Sample parts processed at no charge. Write for details.

Six models are available to meet any production requirement:

Model MVS 32-2 - A 30 x 32 - 2 compartment 3 HP, variable speed barrel.

Model MSS 32-2 - A 30 x 32 - 2 compartment 3 HP, constant speed barrel.

Model MVS 48-2 - A 32 x 48 - 2 compartment 5 HP, variable speed barrel.

Model MSS 48-2 - A 32 x 48 - 2 compartment 5 HP, constant speed barrel.

Model MVS 60-2 - A 36 x 60 - 2 compartment 7½ HP, variable speed barrel.

Model MSS 60-2 - A 36 x 60 - 2 compartment 7½ HP, constant speed barrel.

Check the specifications, design features and construction shown on these pages. You'll see why MURCO Barrels are preferred by operators who want to combine the economy of tumbling processes with sturdy, well built, maintenance-free tumbling barrels to make their installations completely economical.

Write today for MURCO Modern Methods Bulletins 1, 2, and 3 valuable to the experienced operator as well as the beginner. No cost — no obligation.

D. J. MURRAY MANUFACTURING CO.

WAUSAU *Manufacturers Since 1883* WISCONSIN

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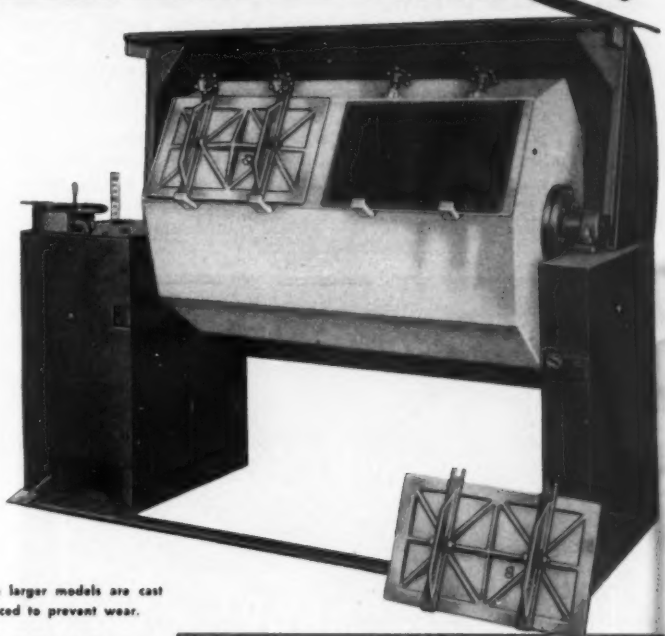
5 H.P. CONSTANT SPEED *and* 5 H.P. VARIABLE SPEED

Murco TUMBLING BARREL NEW!



Be Modern! Buy MURCO! Get performance. Get results through these features:

- **Barrel Section Measurements determined from years of experiments to assure maximum tumbling action.**
- **Simple, fool-proof variable speed drives afford completely versatile operations when different speeds and cycles are required.**
- **Speed changes are made simply through easily operated hand wheels. No cumbersome, time-consuming changes of belts and pulleys.**
- **Lever-type reversing switches permit inching of barrel forward and back with complete control.**
- **Foot operated hydraulic brake at floor level stops barrel in any position. Facilitates loading and unloading. Prevents accidental dumping of loads.**
- **Carefully designed doors lock securely. The larger models are cast aluminum to reduce weight and are neoprene faced to prevent wear.**
- **Door openings on large models are tapered to the inside to prevent lodging of parts when discharging.**
- **Oversized reducers, bearings, wide faced precision cut gears, NEMA frame standard motors assure low maintenance and trouble-free operations.**
- **Operating mechanism accessible from front and back permitting end to end arrangement of barrels in production lines.**
- **Complete hood or partially closed gate guards, assure safe operation.**
- **Ample cubic foot capacity per compartment permits maximum load.**
- **All models available line or unlined.**

All this is yours in MURCO! Why settle for less?

Illustrated above is the Model MVS 48-2 Variable Speed Barrel operated from 9 RPM low to 28 RPM high.

The Model MSS 48-2 Constant Speed Barrel is essentially the same except for the drive mechanism.

The MVS 32-2 and MSS 32-2 Variable and Constant Speed Barrels, not pictured, are similar in construction and appearance.

Write today for MURCO Modern Methods Bulletins 1, 2, and 3 valuable to the experienced operator as well as the beginner. No cost—no obligation.

MODEL	MVS-32-2	MSS-32-2	MVS-48-2	MSS-48-2
SIZE	30" x 32"	30" x 32"	32" x 48"	32" x 48"
MOTOR	3 HP, 220/440 V. 1750 RPM, 3 ph. 60 cycle	3 HP, 220/440 V. 1750 RPM, 3 ph. 60 cycle	5 HP, 220/440 V. 1750 RPM, 3 ph. 60 cycle	5 HP, 220/440 V. 1750 RPM, 3 ph. 60 cycle
SPEED	Variable 8-23 RPM	Constant 22 RPM	Variable 9-28 RPM	Constant 22 RPM
OVERALL LENGTH	61⅛"	61⅛"	79½"	79½"
OVERALL WIDTH	45"	45"	46"	46"
OVERALL HEIGHT	57"	57"	62⅞"	62⅞"
COMPARTMENTS	2	2	2	2
ACROSS FLATS	30"	30"	31⅛"	31⅛"
COMPARTMENT LENGTH EACH	15⅛"	15⅛"	23⅛"	23⅛"
COMPARTMENT CAPACITY EACH	6½ cu. ft.	6½ cu. ft.	12 cu. ft.	12 cu. ft.
LOAD PER COMPARTMENT	750 lbs.	750 lbs.	1750 lbs.	1750 lbs.
DOOR SIZE	12" x 13"	12" x 13"	13" x 21"	13" x 21"
DOOR CONSTRUCTION	Cast Iron	Cast Iron	Cast Alum. Neoprene Faced	Cast Alum. Neoprene Faced
BARREL ENDS	⅜" thick	⅜" thick	⅜" thick	⅜" thick
CENTER PLATE	½" thick	½" thick	½" thick	½" thick
BARREL WALLS	5/16" thick	5/16" thick	5/16" thick	5/16" thick
BRAKE	Hydraulic Foot Operated	Hydraulic Foot Operated	Hydraulic Foot Operated	Hydraulic Foot Operated
MOTOR CONTROL	Magnetic Reversing	Magnetic Reversing	Magnetic Reversing	Magnetic Reversing
GUARD	Closed Bar	Closed Bar	Full Hood	Closed Bar
DRIVE	Gear	Direct	Gear	Gear

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by a number of inter-related variable factors, of which the most easily distinguishable are:

1. The nature of the internal surface of the barrel;
2. The relation between diameter and width of barrel;
3. The number of angular faces;
4. The proportion of the barrel volume occupied by the charge;
5. The ratio between work and media, in volume;
6. The relationship between the specific gravities of the media and work;
7. The presence or absence of a fluid medium;
8. The speed of barrel rotation;
9. Tendency of components to interlock.

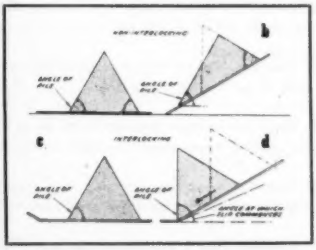
If a very large number of small, identical metal components are tipped from a container upon a level surface, they will assume the form of a cone. If the parts are other than spherical in form, the angle made with the horizontal is dependent upon the degree to which interlocking occurs between individual components.

Assuming that the plane be slowly tilted, one of two effects will occur. If the degree of interlocking between the parts is not great, the angle of pile on the lower side of the heap will adjust itself to its previous value. Should the interlocking effect be preponderant, however, the heap will hold together and, when the tilt is sufficient to overcome the basal friction on the surface, will slide bodily across the plane.

Since in barrel operations, free movement of individual components is essential, this type of interlocking action must be prevented.

This is done by reducing the degree of interlocking through the introduction of smaller masses commonly called media which may be an inert material such as wood pegs used only to hold components apart and carry the abrasive compound, but more commonly the media actually perform a part of the work.

If this medium, or carrier, is added only in sufficient quantity to fill in the interstices of the piled work, the effect is very small; if only a few components are dispersed within a pile consisting mainly of carrier, the angle of repose is substantially that of the carrier itself.



DEGREE OF INTERLOCKING among components will determine the motion of the mass as the plane is tilted. One function of media is to control this sliding motion to obtain the desired cutting and rolling action.

A mid-point between these states is to be aimed at in barrel finishing since free movement must be combined with intimate contact among components in the mass.

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It will be evident from the above that the nature of the tilting surface is of importance, since upon the coefficient of friction between the pile—the charge—and the tilting surface depends the angle that will be assumed before the bulk of the charge begins to slide. With zero friction the charge slides in bulk to the lowest point with the slightest inclination; with a very high coefficient the pile disintegrates almost completely before any movement of the basal layer takes place.

Inside a barrel it is necessary to take into account the frictional effect of the end plates also; as these are brought closer together their retarding effect up-

12,000 Burnished Parts Per Operator Per Shift

The Yale & Towne Mfg. Co., Stamford, Conn., processes zinc base die castings with two basic schedules. For rough deburring, one cubic foot of die cast parts is loaded into a barrel with 750 pounds of limestone chips and eight pounds of compound. The parts are given a rough finish in five hours.

The barrel is stopped and the water is drained out and the barrel thoroughly flushed. Eight pounds of burnishing compound are added and the barrel rotated for an additional two hours. The parts emerge with a burnished surface.

Thus a completely burnished die casting is turned out in seven hours. Loads average 2000 parts, and a single operator can handle six machines. 12,000 finished parts ready for platting for one man per shift would be hard to match by any other method.

(From Economic Possibilities in Tumble Finishing, by Adolph Bregman. Presented at the 19th annual meeting of the American Society of Tool Engineers.)

Briefs on barrel finishing

Technical Service Dept. · **Wyandotte Chemicals Corporation**

Summary: *Barrel finishing offers manufacturers an economical method of finishing small parts in bulk. Steel balls or shapes produce a smooth lustrous finish. Stones remove excess metal, as well. Improvements in technique are widening the field.*

Barrel finishing consists of rotating the work in a barrel together with a burnishing medium and a solution of the burnishing compound. The parts are handled in large quantities and the labor cost per part is low.

The method is especially suited to very small parts. The work is easier to clean than buffed work. It is possible to form definite radii and micro-inch surface finishes. It can produce mirror finishes.

Two media are used: steel balls or stones. Steel balls are used to produce a smooth lustrous finish. They remove almost no metal. Rather, they "iron out" the surface by the rolling and sliding burnishing shapes. Stones, on the other hand, remove excess metal in addition to producing a smooth finish.

The burnishing compound serves as a lubricant between the parts and the burnishing medium and between the parts themselves. In this manner, a smooth finish is obtained, whereas, in its absence, seizure and scratching are easily possible.

Often, the burnishing compound contains a brightening agent to remove metal oxides and yield a true metallic color. Lastly, the burnishing compound should have sufficient detergent action to remove traces of oil and other contaminants from the parts.

The burnishing compound should be selected with care. It should suit both the work and the media. Wyandotte products for this use include: Light Alloy No. 1 Cleaner, Burnishing Compounds 317, 321, Burnek 22, Burnishing Powder and Neosuds*.

By far the greater percentage of small parts can be finished in a barrel with few problems. As the parts become larger and more complex the difficulties do increase. But with ingenuity more and more types of work now considered too difficult or uneconomical will yield to improved techniques of barrel finishing. If you have a problem write us.

*Reg. U. S. Pat. Off.

"Cleaning the World"

THE WYANDOTTE LINE—products for burnishing and burring, vat, electro, steam gun, washing machine and emulsion cleaning, paint stripping, acid pickling, related surface treatments and spray booth compounds. An all-purpose floor absorbent: Zorball. In fact, specialized products for every cleaning need.

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on the movement of the adjacent portions of the charge becomes proportionately greater. This is intensified in practice because the depth of charge in a narrow barrel is always greater in relation to the bulk of the charge than is the case in a wide barrel.

In short, in a narrow barrel the components become more intimately mixed from end to middle than in a wide barrel. This promotes homogeneity of finish, but if the required standard of finish is in any case easily achievable the point is not of great importance. With components that show marked variations of finish when tumbled in wide barrels an improvement can often be effected by changing over to narrow ones or by partitioning the existing chambers, in some cases.

The question of the particle size of the carrier is of considerable importance, but is closely bound up with the form of the components to be processed. If these are of thin section and the carrier is of high specific gravity, they tend to rise to the top of the charge unless the particle size of the carrier is small enough for it to enter convexities and hollow portions of the work. Since the size requirements from this point of view frequently do not agree with the size of carrier needed for most effective burnishing, it is often necessary to use a mixed carrier containing two or three different chip sizes. Segregation can also be avoided to some extent by increasing the speed of revolution, but this may have adverse effects on the finish.

INFORMATION ON THE TUMBLING PROCESS AND MATERIALS

For detailed information on the tumbling process or on the materials used in tumbling, circle the appropriate number on one of the Reader Service Cards bound into this magazine. Drop the card in the mail—no postage is required.

Complete tumbling process, barrels, equipment and supplies (1)
Horizontal tumbling barrels (2)
Tilting tumbling barrels (3)
Plating barrels (4)
Barrel linings (5)
Compounds, abrasive (6)
Compounds, burnishing (7)
Media, chips (8)
Media, metal shapes (9)
Media, wood, leather, felt, etc. (10)
Sawdust and drying compositions (11)
Tumbling material handling equipment (12)
Laboratory and engineering service (13)
Contract tumbling service (14)

The value of a fluid medium is two-fold; it both reduces the impact and promotes a thorough dispersion of the abrasive or lubricating agent. For this reason wet tumbling is used for burnishing rather than for flash or burr removal. Where granite or other stone chips are used as the carrier, wet tumbling prevents the chips from becoming prematurely glazed. It must be remembered, nevertheless, that wet-tumbling components call for more exacting cleansing after removal from the barrel to remove all traces of the abrasive. Moreover, unless they are to undergo further processing—such as barrel-plating—immediately, they must be dried quickly in air before storage.

In the dry deburring of small components by barreling certain difficulties are recurrent, and although they must usually be dealt with empirically some suggestions may perhaps be made for overcoming them. A frequent trouble is the breakage or distortion of fragile projections, which may result either from excessive impact or from the parts locking together.

Remedies—in the order in which they should be tried—are: reduction of the speed of rotation, the use of a smaller charge, an increase in the ratio of carrier to work, an increase in the chip size of the carrier.

Another fault, particularly characteristic of die castings, is the hammering-up of the flash along the wall of the component. This can usually be overcome by adding a quantity of tumbling stars to the carrier. These are also of value when it proves difficult to remove fins cleanly from re-entrant angles on the components.

The form of distortion where the edges of the component are are hammered back, results from tumbling the charge too long. It occurs most often when it is attempted to combine flash removal with burnishing. Usually, a quick dry tumbling with large chips to remove fins should precede the burnishing tumble, whether the latter is carried out wet or dry.

Objective of Operation

Flash Removal. The breaking off of flash and blending of the parting line is entirely practical by barrel processing, provided the flash is not excessively thick, and its location is such that the impingement of media and other castings will tend to break the flash rather than hammer it back against the wall of the casting.

BY CLOSING UP SURFACE POROSITY, barrel finishing is suited for pre-plating treatment of die castings.

One processor has recommended a very slow barrel speed at the beginning of the cycle so that the sharp edges of flash will not scratch or damage other

Elimination of Tedious Job And 50 Percent Unit Saving

A midwestern die caster produces approximately 70 tons of die castings per day. Among the castings produced are some extremely small irregularly shaped parts.

Hand finishing of these parts, which included hand filing of burrs, was a slow and tedious process. Not only were labor costs per part rather high, but also the employes who were engaged at the task found it tedious and disagreeable.

The company switched from hand operations to barrel finishing on more than 2500 different parts. The net result of this change was an average 50 per cent reduction in the finishing costs of the die castings that were barrel finished. A result which cannot be calculated in terms of dollars and cents or percentages is the increased employe satisfaction with the elimination of difficult, tedious work.

In one operation where die castings are being prepared for plating by hand, one operator and a helper working with four tumbling barrels now do the work that required the services of eight semi-skilled employes.

(From Economic Possibilities in Tumble Finishing, by Adolph Bregman. Presented at the 19th annual meeting of the American Society of Tool Engineers.)

smooth surfaces. This should continue for five or 10 minutes, and then the barrel should be revolved at higher speeds until the cutting down process has been accomplished, and then returned to a slower speed for higher color.

Generally, flash removal is considered a part of the grinding or polishing operation, and there is a general similarity between the recommended practices for these jobs, except for the longer cycle required for grinding and cutting down.

Thus, a manufacturer who recommends bonded chips or steel slugs with a cleaning compound for flash removal, recommends a similar batch for grinding and deburring, except that for increasing the cutting action, he replaces the cleaning compound with an abrasive material. Length of cycle depends, of course, upon the amount of work to be done, and may be as short as 15 minutes, or, in the case of considerable cutting action, may require 12 hours.

Where the natural grinding chips are called for by another manufacturer, a very similar flash removal cycle is called for using an abrasive compound with length of cycle ranging from 15 minutes to eight hours, but for cutting down, a longer operation is indicated, probably due to the somewhat finer abrasive and softer natural bonding material. This latter factor may be used to influence the surface toward brightness, even on the cutting cycle.

Zinc diagonals are the choice of a processor who recommends an aluminum oxide abrasive for all cutting down jobs, and varies the length of cycle from one to 10 hours. Almost all processors call for wet tumbling although one barrel manufacturer points out that dry processing with

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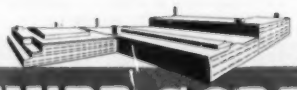

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ivory chips and wood balls, together with graded abrasive compounds, can be used for removing burrs and light flash from castings with good quality surface.

Polishing. Either natural mineral chips or synthetic bonded abrasives such as aluminum oxide graded lumps are used for polishing action, or a comparable action may be developed by the use of organic media such as wooden pegs or ivory chips and an abrasive compound.

Here again, there is a wide variation in the length of cycle recommended, due to the character of surface to be obtained, amount of metal to be removed, severity of the metal cutting action of the abrasive material, and the speed of rotation. It has generally been observed that the faster rotation speeds induce more rapid cutdown and coarser surfaces. If the polishing is to be followed by a coloring or burnishing, the cutting is usually faster, since final finish is secured in the subsequent steps.

Burnishing. Barrel finishing can be used to condition the surface of a die cast part without the removal of metal. This accomplished by burnishing or coloring. These two terms are almost synonomous, and some barrel finishing technicians do not differentiate between them.

Burnishing is a final finishing process on aluminum die castings, but it is used to produce a high luster surface on zinc die castings suitable for plating. To some extent, it has a cold-working effect on the surface of the part.

Burnishing can be accomplished with steel balls, steel shapes or the softer mineral chips. Usually a burnishing compound is used, but steel balls and shapes are sometimes used with no other lubrication than water. This is largely governed by the shape of the die casting being burnished, since some shapes have a self-burnishing action. Speeds average 20 rpm for burnishing, and the cycle is rarely over two or three hours. Brass die castings take somewhat longer than those of other materials. Great care must be taken in selecting a speed and load height, since it is essential that the parts do not nick each other.

Several of the barrel finishing process companies have developed combination processes, in which two or more operations are carried out without removing the parts from the barrel.

Although these processes vary from one company to another, they are similar in some respects. The barrel is loaded with die castings, cutting chips or shapes and an abrasive compound and started. When the grinding part of the cycle has been completed the barrel is stopped and the parts are washed in the barrel. A finer media and a lubricating compound are added, and the barrel is started again. The second part of the cycle is a burnishing operation, and when the die castings are removed and washed, they are ready for plating.

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special jobs for which barrels may be used in finishing die castings, other than the production of a mechanical cutting or burnishing action, are barrel plating, paint application, drying of plated castings and graphite lubrication of lock parts.

One major toy manufacturer reported recently that as much as 80 per cent of its electroplating is being done in rotating barrels. Barrel plating has certain similar economic advantages to those claimed for the tumbling processes—elimination of individual handling of each part. Although this process cannot be considered in detail here, there are a number of companies who specialize in the manufacture of this type of plating equipment.

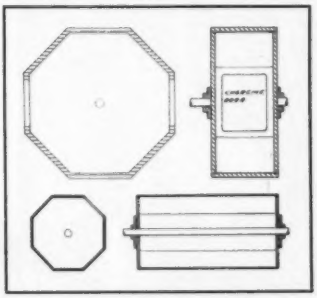
Application of paint by barrel operation is practiced by another manufacturer of small toys who tumbles thousands of very small die cast premium items and toys in tilting barrels, then screens them and dries them in convection ovens.

Quite common throughout the plating industry where die castings or other small parts are processed, a quick barrel operation using sawdust or ground up corn cobs or corn meal serves as a good dry-off after chrome plating to prevent castings from being spotted or streaked by the rinse water.

Design for Tumbling

Long before the die casting reaches the point of being dumped into a tumbling barrel, the process can be expedited by judicious planning of the parts and the exercise of reasonable care at the die casting machine.

The product designer who knows that some type of barrel finish is to be part or all of the mechanical surface treatment, can make slight adjustments in contour, radii, surface detail or shape to facilitate the tumbling. He may thus be able to sidestep such difficulties as trapping tumbling compound or media, breaking off of fragile projections, obliterating surface detail or failure to reach all surfaces satisfactorily.



A COMMON TYPE of tumbling barrel is indicated, *above*, consisting of a horizontal octagonal unit of varying width.

Similarly, in the construction of the die casting die, location of parting lines can sometimes be changed to bring them into position where the barrel operation will do the most effective job of removal. Furthermore, depending upon the specific shape and complexity of the part, it is possible to control the temperature, pressure and rate of flow of the molten metal

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into the die to reduce or eliminate deep surface foliation and other defects which are difficult to remove by any but the harshest abrasive action.

A review of some of the tricks of designing die castings for tumbling was recently presented by DIE CASTINGS (March 1951, page 25) and no attempt will be made here to repeat this information. However, it is possible to accomplish such improvements as reducing a 2½ hour deflashing tumble to a 20 to 40 minute cycle by gang trimming small die castings, leaving 0.002 to 0.004 clearance.

Suggestions for overcoming the breakage of fragile projections, of cleaning out flashed over openings were included. Other help which the product designer can supply is to make certain surface detail is deep and clear enough to withstand the abrasive action which surface conditioning requires. Sometimes this requires a slight-

(Continued on Page 63)

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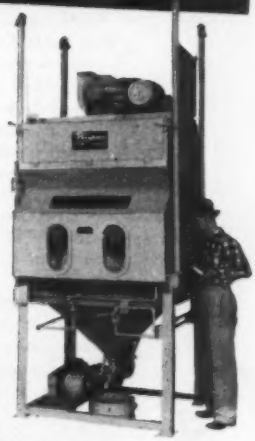

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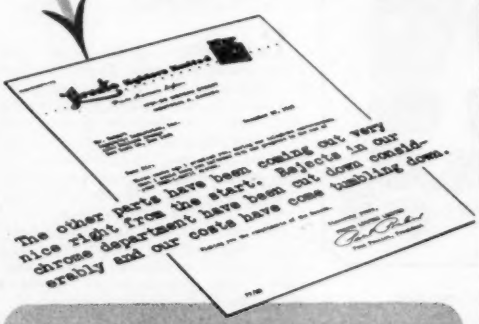
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(To find products manufactured by these companies consult product directory listing.)

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Almco Division, Queen Stove Works, Inc.
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H. J. Astle Co.
Orange & Friendship Streets
Providence, R. I.

Baird Machine Co.
Stratford, Conn.

Belke Mfg. Co.
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Chicago 51, Ill.

Cincinnati Cleaning & Finishing Machine Co.
1951 Hecla Street
Ironton, Ohio

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3465 North Kimball Ave.
Chicago 13, Ill.

Daniels Plating Barrel & Supply Co.
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Newark 5, N. J.

Du-Lite Chemical Corp.
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Middletown, Conn.

Enthone, Inc.
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New Haven, Conn.

B. F. Goodrich Co.
448 South Main Street
Akron, Ohio

Goodyear Tire & Rubber Co.
1144 East Market Street
Akron 16, Ohio

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Cleveland 2, Ohio

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Sturgis, Mich.

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Kearny, N. J.

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Garfield, N. J.

Lasalco, Inc.
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Michael Wood Products, Inc.
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Garfield, N. J.

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900 Fauquier Ave.
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Cincinnati 16, Ohio

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New York 66, N. Y.

Udylite Corp.
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Detroit 11, Mich.

United States Rubber Co.
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New York 20, N. Y.

Wyandotte Chemicals Corp.
Alkali Square
Wyandotte, Mich.

FINISHING EQUIPMENT DIRECTORY

Product Listing

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Hartford Steel Ball Co.
Lasalco, Inc.
Chas. F. L'Hommedieu & Sons Co.
J. C. Miller Co.
N. Ransohoff, Inc.
Roto-Finish Co.
Frederic B. Stevens, Inc.
Tumb-L-Matic, Inc.

BARRELS, CLEANING

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BARRELS, DRYING

Baird Machine Co.
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Cincinnati Cleaning & Finishing Machinery Co.
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Globe Stamping Div., Hupp Corp.
J. C. Miller Co.
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Roto-Finish Co.
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Chas. F. L'Hommedieu & Sons Co.
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Crown Rheostat & Supply Co.
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Grav-i-flow Corp.
Frederick Gumm Chemical Co., Inc.
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Henderson Bros. Co.
Lasalco, Inc.
Chas. F. L'Hommedieu & Sons Co.
J. C. Miller Co.
N. Ransohoff, Inc.
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BARRELS, VERTICAL

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Grav-i-flow Corp.
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Oakite Products, Inc.
N. Ransohoff, Inc.
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Frederic B. Stevens, Inc.
Wyandotte Chemicals Corp.
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Frederick Gumm Chemical Co., Inc.
Lasalco, Inc.
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Daniels Plating Barrel & Supply Co.
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Grav-i-flow Corp.
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Enthone, Inc.
Grav-i-flow Corp.
Chas. F. L'Hommedieu & Sons Co.
J. C. Miller Co.
Roto-Finish Co.
Frederic B. Stevens, Inc.
Tumb-L-Matic, Inc.

LINING, METAL

Belke Mfg. Co. (lead)
Daniels Plating Barrel & Supply Co.
Grav-i-flow Corp.
Chas. F. L'Hommedieu & Sons Co.
J. C. Miller Co.
Roto-Finish Co.
Frederic B. Stevens, Inc.

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Almco Div., Queen Stove Works, Inc.
Baird Machine Co.
Belke Mfg. Co.
Daniels Plating Barrel & Supply Co.
Enthone, Inc.
Grav-i-flow Corp.
B. F. Goodrich Co.
Goodyear Tire & Rubber Co.
Frederick Gumm Chemical Co., Inc.
Lasalco, Inc.
Chas. F. L'Hommedieu & Sons Co.
Manhattan Rubber Div., Raybestos-Manhattan, Inc.
J. C. Miller Co.
Roto-Finish Co.
Frederic B. Stevens, Inc.
Tumb-L-Matic, Inc.
United States Rubber Co.

LINING, WOOD

Abbott Ball Co.
Baird Machine Co.
Belke Mfg. Co.
Crown Rheostat & Supply Co.
Daniels Plating Barrel & Supply Co.
Enthone, Inc.
Grav-i-flow Corp.
Lasalco, Inc.
Chas. F. L'Hommedieu & Sons Co.
J. C. Miller Co.
Roto-Finish Co.
Sommers Bros. Mfg. Co.
Frederic B. Stevens, Inc.
Tumb-L-Matic, Inc.

SAWDUST AND DRYING COMPOSITIONS

Almco Div., Queen Stove Works, Inc.
Belke Mfg. Co.
Daniels Plating Barrel & Supply Co.
Grav-i-flow Corp.
Frederick Gumm Chemical Co., Inc.
Lasalco, Inc.
Chas. F. L'Hommedieu & Sons Co.
J. C. Miller Co.
Roto-Finish Co.
Frederic B. Stevens, Inc.
Tumb-L-Matic, Inc.

TUMBLING, COMPLETE PROCESS

Almco Div., Queen Stove Works, Inc.
Crown Rheostat & Supply Co.
Daniels Plating Barrel & Supply Co.
Enthone, Inc.
Grav-i-flow Corp.
Frederick Gumm Chemical Co., Inc.
Lasalco, Inc.
Chas. F. L'Hommedieu & Sons Co.
J. C. Miller Co.
N. Ransohoff, Inc.
Roto-Finish Co.
Frederic B. Stevens, Inc.
Tumb-L-Matic, Inc.

TUMBLING, ENGINEERING SERVICE

Almco Div., Queen Stove Works, Inc.
Belke Mfg. Co.
Crown Rheostat & Supply Co.
Daniels Plating Barrel & Supply Co.
Enthone, Inc.
Grav-i-flow Corp.
Frederick Gumm Chemical Co., Inc.
Globe Stamping Div., Hupp Corp.
Chas. F. L'Hommedieu & Sons Co.
J. C. Miller Co.
Minnesota Mining & Mfg. Co.
Roto-Finish Co.
Frederic B. Stevens, Inc.
Tumb-L-Matic, Inc.

TUMBLING MEDIA, CHIPS

Almco Div., Queen Stove Works, Inc.
Belke Mfg. Co.
Crown Rheostat & Supply Co.
Daniels Plating Barrel & Supply Co.
Enthone, Inc.
Grav-i-flow Corp.
Lasalco, Inc.
Chas. F. L'Hommedieu & Sons Co.
J. C. Miller Co.
Minnesota Mining & Mfg. Co.
Norton Co.
N. Ransohoff, Inc.
Roto-Finish Co.
Frederic B. Stevens, Inc.
Tumb-L-Matic, Inc.

TUMBLING MEDIA, COMPOSITION

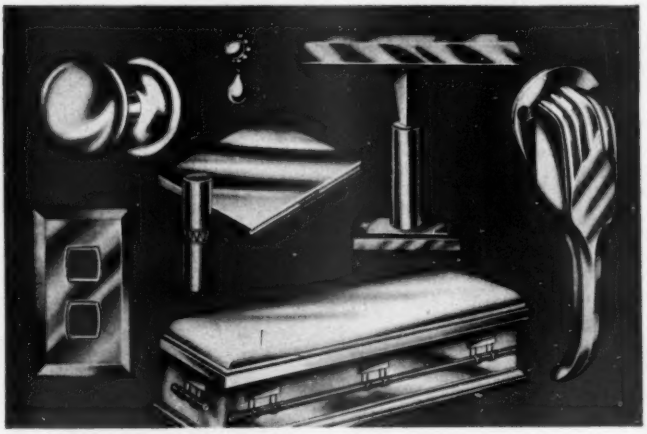
Almco Div., Queen Stove Works, Inc.
Belke Mfg. Co.
Crown Rheostat & Supply Co.
Daniels Plating Barrel & Supply Co.
Enthone, Inc.
Lasalco, Inc.
Chas. F. L'Hommedieu & Sons Co.
J. C. Miller Co.
Minnesota Mining & Mfg. Co.
N. Ransohoff, Inc.
Roto-Finish Co.
Frederic B. Stevens, Inc.
Tumb-L-Matic, Inc.

TUMBLING MEDIA, METAL SHAPES

Almco Div., Queen Stove Works, Inc.
Belke Mfg. Co.
Daniels Plating Barrel & Supply Co.
Frederick Gumm Chemical Co., Inc.
Chas. F. L'Hommedieu & Sons Co.
J. C. Miller Co.
N. Ransohoff, Inc.
Roto-Finish Co.
Frederic B. Stevens, Inc.
Tumb-L-Matic, Inc.

TUMBLING MEDIA; WOOD, LEATHER, FELT AND OTHER

Kube-Kut, Inc.
Chas. F. L'Hommedieu & Sons Co.
Michael Wood Products, Inc.
J. C. Miller Co.
N. Ransohoff, Inc.
Roto-Finish Co.



NOW... simulate copper, brass and bronze on products like these with M & W PLATELUSTRE

Don't let critical metals put a *needless* crimp in your production!

Take zinc or steel—apply a coating of one of the new PLATELUSTRE finishes. You wind up with products and parts that look so much like copper, brass and bronze that *the eye can scarcely tell the difference!*

Whether you have been using now unavailable copper and its alloys for *making* products or for *plating* products, you will find these new M & W finishes *equally* effective in keeping your plant running. There are types for air-drying and baking schedules—pick the one that best fits *your* production requirements.

Let an M & W Technical Service Engineer show you—*right in your own plant*—how easy these PLATELUSTRE coatings are to use, and what striking effects they produce. Or, if you prefer, write for free literature.

PIONEERS IN PROTECTION

75th ANNIVERSARY M & W CO. 1876

MAAS & WALDSTEIN CO. 435 RIDGEDALE AVE. NEWARK 4, N. J.

MID-WEST DIV.-1658 CARROLL AVE., CHICAGO 12, ILLINOIS
PACIFIC COAST DIV.-SMITH-DAVIS CO., 10751 VENICE BLVD., LOS ANGELES 34, CAL.
MANUFACTURERS OF INDUSTRIAL FINISHES

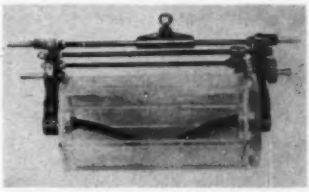
Circle No. 50 on Reader Service Card for more information.

NEW Products

For additional information on the products appearing on this and the following pages, mark the key number of the item on one of the cards bound into this issue. Drop the card in the mail—no postage is required.

COMPLETE CYCLE PLATING BARREL

Plexiglass Plating Barrel Cylinder.
Hanson-Van Winkle-Munning Co., Matawan, N. J.



SPECIAL FEATURES: Barrel equipped with this cylinder can be used through complete plating cycle of cleaning, pickling and plating, since Plexiglass is impervious to both cyanide and alkaline solutions. Improved hangar arm construction.

SPECIFICATIONS: Cylinder guaranteed for temperatures to 185 F. Heads are 1" thick, panels ½" thick, "V" shaped panels to strengthen cylinder and improve tumbling action. Furnished with flexible, hair pin type or disc contacts. For use with cyanide solutions only, cylinders will be supplied with 90-tooth gears and hangar arms of cast iron. Other cylinders will have 90-tooth Merlon or Plexiglass gears and rubber-covered cast iron hangars.

For additional information circle No. 92 on the Reader Service card.

ONE-COAT MULTI-COLORED FINISH USING SINGLE GUN AND CONTAINER

Plextone
Maas & Waldstein Co., Newark, N. J.

SPECIAL FEATURES: The finish is either flat or glossy, and can be applied to almost any surface. It appears as a network of interlaced but separate colors.

SPECIFICATIONS: Can be sprayed on with a single gun and container. Gives a tough washable finish with good hiding power. Has the appearance of leather, granite, marble and other multi-color materials. Colors can be mixed on the job to give the desired effect.

For additional information circle No. 93 on the Reader Service card.

MACHINE CUTS ODD SHAPES

Model 430 Nibbling Machine
Campbell Machine Div., American Chain & Cable Co., Inc., Bridgeport, Conn.

SPECIAL FEATURES: These machines are designed to produce odd shapes in ferrous and non-ferrous materials. The work is said

CUT SPRAY PAINTING COSTS on many defense items

such as the shells and rocket bombs illustrated, by sharply increasing production through the use of

ELECTRO-FORMED METAL MASKS

(Made by patented process)

designed to fit into your conveyorized equipment.

WE ALSO DESIGN, ENGINEER AND BUILD

COMPLETE AUTOMATIC SPRAY EQUIPMENT

(with or without masks)

MASK WASHING EQUIPMENT and **AIR-OPERATED CLAMPS, FIXTURES AND TOOLS** for positioning parts in masks while painting or holding parts in place for other operations, such as welding.

Plug-type masks for keeping depressed areas clear, while spraying background; lip-type masks for protecting the background while painting depressed areas; and block cutout plane surface type masks.

Clean, sharply defined letters and decorative effects are obtained on intricate die castings, stampings and plastic forms by accurate control of painted areas with no fogged edges. Afterwiping or buffing off of overspray is unnecessary. The "loose" inside of letters and numerals, such as "O" and "6", is held in position by arched bridging to eliminate objectionable "ties."

SEND COUPON NOW!

CONFORMING MATRIX CORPORATION
346 Toledo Factories Building — Toledo 2, Ohio

Please send, without obligation, details on ☐ Hand masks; ☐ Mechanical masking fixtures; ☐ Air-operated masking fixtures; ☐ Stationary automatic spray painting masking machines; ☐ Rotary table automatic spray painting masking machines; ☐ Quotation on masks for parts (or prints) which I am forwarding.

NAME .....
FIRM .....
STREET .....
CITY & STATE .....

Circle No. 32 on Reader Service Card.

New DUMORE AUTOMATIC DRILL HEAD

Cuts costs 6 ways on small-hole drilling

Check these exclusive features

- ∨ More Holes per Minute
- ∨ Less Drill Breakage
- ∨ Less Scrap Loss
- ∨ Fast Set-up
- ∨ Self-Contained Air
- ∨ Lower Labor Costs

Here is the most revolutionary production tool ever offered to the small-drill user — a compact, completely automatic drill head with self-contained air, controlled feed and speed, and extreme flexibility of set-up.

Because it operates at, but never over, optimum capacity of the drill, it gives you maximum production with minimum drill breakage — drill savings alone pay for the tool in short order on the majority of installations.

See the New Automatic Drill Head at your Dumore Distributor or write today for free 16-pg. bulletin. DDH-3C

The DUMORE Company
1300 17th STREET, RACINE, WISCONSIN
Export Address: 13 E. 40th St., New York, N.Y., U.S.A.

Circle No. 43 on Reader Service Card.

to be 40 to 60 times as fast as drilling and filing. Shapes are left with surface smooth enough to eliminate most finishing operations.

SPECIFICATIONS: Model 430 has a throat depth of 30 inches and will cut non-ferrous materials up to 14 inch. Material feeds equally well in all directions. Other models available to throat depth of 36 inches and cutting depth of ½ inch.

For additional information circle No. 94 on the Reader Service card.

AUTOMATIC PAINT SPRAYER

Automatic Indexing Spraying Machine
Conforming Matrix Corp., Toledo, Ohio

SPECIAL FEATURES: Paints three colors simultaneously. Capacity 18,000 pieces per eight-hour shift. Machine is entirely air-powered. Baffles and exhaust system prevent mixing of colors. Machine has only three controls.

SPECIFICATIONS: Machine has eight masks, three for each color. Power supply is 90 pounds air pressure. Indexes 22 times per minute. Painting occurs during rest time automatically. One operator needed at each station to move parts from one mask to the next, and one operator to remove parts when finished. Uses 14 DeVilbiss spray guns underneath table. Paint is continuously circulated through

WHICH SOILS ARE HARDEST TO REMOVE?

- ☐ buffing compound residues
- ☐ pigmented drawing compounds
- ☐ oils and greases
- ☐ heat scale
- ☐ rust, oxides
- ☐ carbon smuts
- ☐ tarnish
- ☐ flux residues
- ☐ rust preventives

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SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

OAKITE PRODUCTS, INC.
34G Thames St., New York 6, N. Y.

Tell me about Oakite methods for removing the following soils:

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☐ ALSO send a FREE copy of your booklet *"Some good things to know about Metal Cleaning"*

NAME _____

COMPANY _____

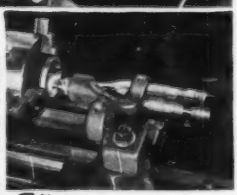
ADDRESS _____

Circle No. 52 on Reader Service Card.

ACCURACY TO .0001"
FOR TOOL ROOM AND PRODUCTION

FOR LESS THAN $150

IN PRECISE MOUNTS ON LATHES AND OTHER MACHINE TOOLS, PRECISE GRINDER-MILLERS WITH 1/4 H.P. AND SPEEDS FROM 20,000 TO 40,000 R.P.M. DO THE WORK OF SINGLE-PURPOSE MACHINES COSTING 100 TIMES AS MUCH!



VERSATILITY. For cylindrical, internal, external and form grinding; for milling with H. S. steel or **tungsten carbide** midget mills; for micro-finishing and polishing. Use on wood, glass, rubber, plastics, or any metal including the hardest alloy steel.

DURABILITY. All metal housing, rigid PRECISE quill, lubricant-sealed, micro-precision bearings 1/4 H. P., AC-DC motor (115 volts) is protected by replaceable fusetrons.

ATTACHABLE COOLFLEX SHAFT (optional). Quickly attached for bench work and handtool applications. Same speeds, same precision quill as in PRECISE GRINDER-MILLERS.

Write FOR CATALOG

PRECISE PRODUCTS CO., 1342 Clark St., Racine, Wis.

PRECISE GRINDER-MILLERS

Circle No. 33 on Reader Service Card.

lines and guns to maintain proper viscosity. Three controls regulate air for guns, cycling speed and amount of paint applied. Machine is automatically lubricated.

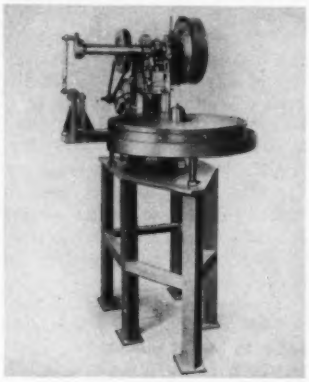
Circle No. 95 on Reader Service Card for more information.

TRIM AND PUNCH PRESS

Speedex 5 Ton Dial Feed Punch Press

O. F. de Castro & Associates, Los Angeles, Cal.

SPECIAL FEATURES: This press is designed for trimming, punching and press fitting die castings and other small and



medium-sized parts. Indexing table has special arrangements to lock table in place while ram is in motion.

SPECIFICATIONS: Five ton back-geared O. B. I. press. Semi-steel frame. Bronze bushed bearings. Back gear housing has alloy shaft on sealed ball bearings. Available in 1" or 2" stroke. Timing of index feed adjustable by rotating timing cam on crankshaft. Positive acting index feed reported accurate to .0002. Furnished with either 12", 15" or 24" diameter index feeds.

For additional information circle No. 96 on the Reader Service Card.

FLAT PLATE FOR TOOL WORK

Micro-Flat

Collins Granite Surface Plate Co., Los Angeles, Cal.

SPECIAL FEATURES: A flat surface for laying out work in tool and die making, inspection and precision instrument assembly. Said to cost less than cast iron, yet be harder than tool steel.

SPECIFICATIONS: Made of black granite. Accuracy up to 50 millionths of an inch. Non-magnetic, non-deflecting, non-glaring and requires no oiling. Will not corrode. Available in sizes from 9" by 12" to 54" by 108". Life is said to be unlimited.

For additional information circle No. 97 on the Reader Service Card.

How Leading Die Casters *Increase Production* on these 11 FINISHING OPERATIONS

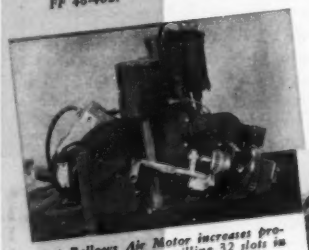
ASSEMBLY
BROACHING
DRILLING
GRINDING
MILLING
MARKING
PUNCHING
ROUTING
SAWING
TAPPING
TURNING

Getting parts to and from a machine is one bottleneck that cuts into machine output. Hand feeding of spindles or other tool holders is a second. Hand clamping of parts into jigs or fixtures is a third.

Die casters who apply standard Bellows "Controlled-Air-Power" tool or work feeders, and work holding and clamping devices to their present machines, or who incorporate them in special purpose tool room built machines, report production gains of 25, 50, 75% or more.

These versatile, inexpensive, easily installed pneumatic power units feed tools with the sensitive touch of a skilled operator; they feed parts quickly and accurately to machines; they clamp and hold parts in position, release and eject them. The machine sets the production pace, yet the elimination of operator fatigue is so pronounced that frequently one operator can run two or more machines.

Output in facing zinc die cast record changer jumps from 40 to 80 per hour with "Controlled-Air-Power" on the job. FF 46-402.



A Bellows Air Motor increases production 100% in milling 32 slots in die cast motor head. FF 48-714.

A Bellows Drill Press Feed more than triples production in reaming 7/16" hole in die cast auto part. FF 49-881.

MAY WE SEND YOU

Our latest Foto Facts File? Actual case histories sent us by leading plants, complete with photographs, wiring diagrams, etc. You'll be interested, too, in reading our new bulletin "Faster, Safer, Better Production." They're free on request. Write The Bellows Co., Dept. DC551, Akron 9, Ohio.

1218-1

The Bellows Co.
AKRON 9, OHIO
FASTER, SAFER, BETTER PRODUCTION — WITH "CONTROLLED-AIR-POWER"

ABRASIVE EXPERT helps customers at one of the new 3M Demonstration Rooms.

Grinding problems? Bring them to a 3M Demonstration Room!

Grinding costs too high, production too slow? You can get fast, *expert* help at the nearest 3M Demonstration Room, staffed with 3M Methods Engineers.

Skilled operators will grind samples from your production line, work out new methods and recommend the type of coated abrasive that's best, most economical for the particular job.

Come in anytime with any kind of problem—from heavy grinding to fine finishing. Chances are we can assist you. 3M Demonstration Rooms: Boston, Chicago, Cincinnati, Cleveland, Detroit, Grand Rapids, Los Angeles, New York, Philadelphia, St. Louis, St. Paul, San Francisco, and Seattle. Send the coupon below for further information.

Minnesota Mining & Mfg. Co., Dept. DC551
St. Paul 6, Minn.

☐ Please have a 3M Methods Engineer call.

☐ Please send copy of new "Step Up Production" booklet explaining the 3M Method of Grinding and Finishing.

3M ABRASIVE BELTS

Name.....

Firm.....

Address.....

City.....Zone.....State.....

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Adhesives. General Export: Durex Abrasives Corp., New Rochelle, N. Y. In Canada: Canadian Durex Abrasives Ltd., Brantford, Ontario.

Circle No. 38 on Reader Service Card for more information

SIGNAL CORPS CONTRACT

(Continued from Page 36)

necessary to straighten them on a press before assembling.

Weight has been kept well below the specifications. With a die cast aluminum front cover and two-piece deep drawn aluminum shell, the complete unit weighs about 13½ pounds.

In addition to the water testing mentioned above, a number of other severe tests are performed requiring the highest calibre performance from both the housing parts and the electronic components. The Multimeter is vibrated on a special vibration table, and it is given a shock test on the rear of a truck with steel plate flooring. The truck is driven over a rough course simulating actual service conditions under which the Multimeter may be expected to operate.

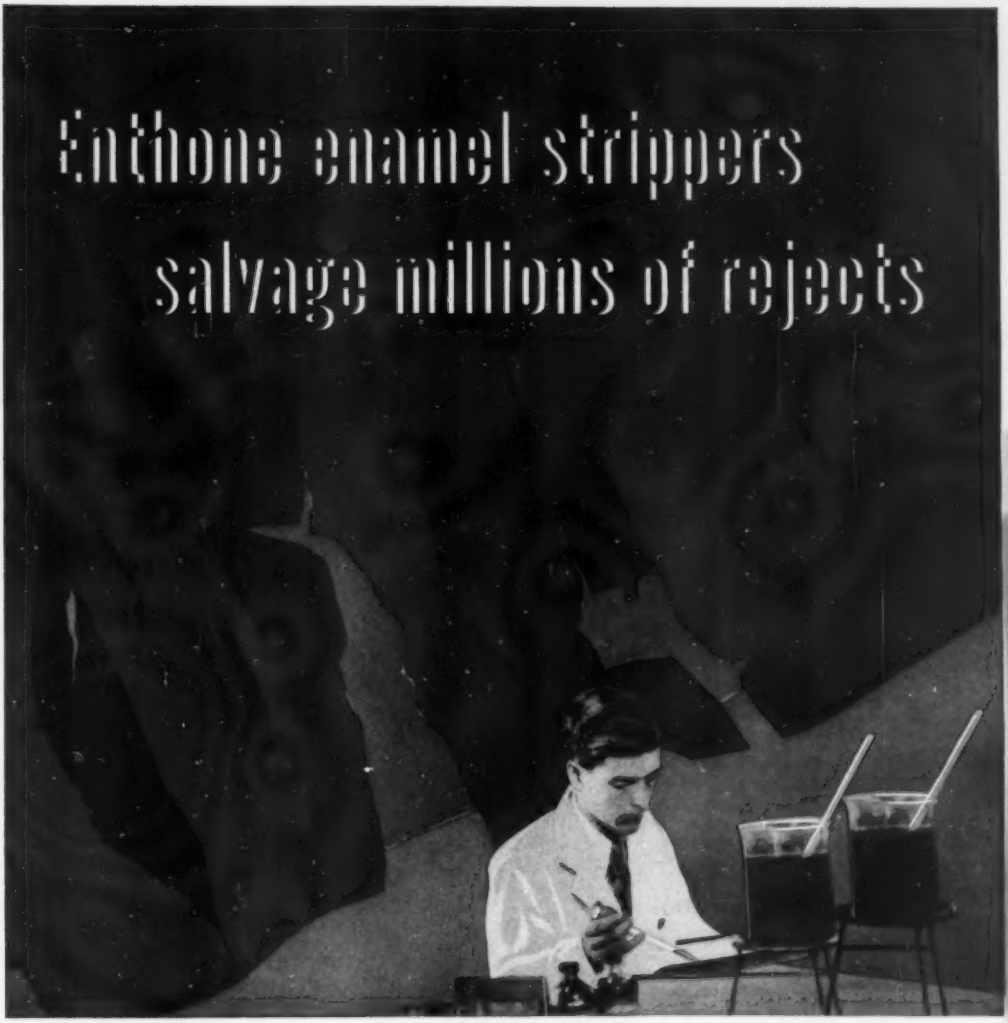
The fully loaded case is dropped 40 inches onto a concrete floor to test it for shock resistance. It is also placed in a salt spray chamber, tested for resistance to fungus growth, given a humidity test and submitted to a temperature cycling test.

The use of an aluminum die casting for the major structural element has been an important factor in the successful manufacture of the Multimeter. Its strength and stability, and the adequate protection of its surfaces by secondary processing, has enabled us to produce a piece of equipment which meets all performance specs, and also to show a reasonable profit for our work.

R. L. McCANN ELECTED PRESIDENT OF NEW JERSEY ZINC

At a recent meeting of the board of directors of the New Jersey Zinc Co., R. L. McCann was elected president of the company. Mr. McCann succeeds Henry Hardenbergh, who was elected chairman of the board.

Mr. McCann was formerly general manager of mines of the company.



ENAMEL STRIPPERS... Built to Order

Enthone's procedure for selecting scientifically the best stripper for paints, varnishes, lacquers or enamels is simple. You fill out a questionnaire and send it with typical samples of parts to be stripped to New Haven. Here, skilled chemists test the action of many production-proven strippers. If none of these meets the requirements, a new stripper will be developed. Our experience of 15 years in solving stripping problems is at your service.

Write for check list . . .

Sixty Products and Processes for Metal Finishing

ENTHONE

Circle No. 30 on Reader Service Card for more information.

442 Elm Street, New Haven, Conn.

USEFUL LITERATURE

For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop card in the mail—no postage is required.

144 BUFFING COMPOUND REMOVAL:

How to eliminate hand work and reduce plating rejects due to inadequate removal of tripoli buffing compound is described in literature available from the Magnus Chemical Co.

145 POLISHING, BUFFING, GRINDING EQUIPMENT:

Information on polishing, buffing and grinding equipment manufactured by the Murray-Way Corp. is given in a company catalog. Two new polishing heads are included in the items covered.

146 TUNGSTEN CARBIDE TOOL LINE:

Solid tungsten carbide tools, including rotary files, reamers, end mills, boring bits, grinding tools, knurls, small countersinks and drills, manufactured by the Atrax Co. are shown in a catalog issued by the company.

147 POLISHING WITH POWER BRUSHES:

Power driven brushes for cleaning, grinding and polishing, as well as paint, varnish, chip removal and maintenance brushes are shown in a 76-page catalog from the Osborn Mfg. Co. The catalog has a section devoted to helping the user select brushes for specific jobs.

148 GOVERNMENT SPECIFICATIONS FOR SURFACE TREATMENT:

Designed to be attached to the company's general Prep products brochure, this sheet gives government specifications for surface treatments on metal and gives the name of the Neilson Chemical Co. product which meets that specification.

149 CHROME PLATING SERVICE DESCRIBED:

A new plating plant which will do chrome plating for industrial concerns is described in a folder available from the Cro-Plate Co., Inc. The company also manufactures the Cro-Hone, a wet-blasting unit, and the Cro-Plater, a complete chromium plating unit.

150 AMORPHOUS PHOSPHATE COATINGS FOR PROTECTING ALUMINUM:

Alodizing, a chemical process that is used to form a protective and paint-bonding coating on aluminum, is described in literature available from the American Chemical Paint Co. The amorphous phosphate coating is integral with the surface of the aluminum.

151 SYNTHETIC ENAMEL RESEMBLES CHROMIUM:

A synthetic enamel that is said by the manufacturer to resemble chromium is described in literature available from the Maas & Waldstein Co.

152 NEW CARBIDE TOOLS FOR OLD:

Literature on carbide tool regrinding and reworking is available from Severance Tool Industries, Inc. The company's facilities for salvaging worn or discarded tools and reworking new tools to meet present requirements are available without DO ratings.

153 POLISHING AND BUFFING ACCESSORIES:

Backstand belt equipment, as well as other production polishing and buffing accessories, is illustrated and described in a catalog available from the Manderscheid Company. One item shown is a backstand idler which can be quickly adjusted for any length belt from 84 to 168 inches.

154 BRIGHT FINISH AS CHROME SUBSTITUTE:

Replacement of chrome finishing by the use of Iridite chemicals is the subject of an Allied Research Products, Inc., bulletin. Comparisons are given of appearance, corrosion resistance and abrasion resistance of the finished surface.

155 CHEMICALLY PURE WATER:

Tap water can be converted to chemically pure water equivalent to triple-distilled water with a filter called the Enley Demon, according to the manufacturer. Descriptive literature is available from Enley Products, Inc.

156 REMOVING OIL, GREASE, DIRT:

Oil, grease, carbon, dirt and paint removal by the solvent detergent method is the subject of a 24-page illustrated booklet offered by Oakite Products, Inc.

157 SOFT ABRASIVE BLAST CLEANING:

Grits such as ground corn cobs, walnut shells, peach pits and sawdust are used in the removal of grease and dirt by blasting from parts without damaging the parts' surfaces. Details and illustrations are included in a bulletin issued by the Pangborn Corp.

158 PORTABLE HARDNESS TESTER:

A portable, direct-reading hardness tester is described in literature offered by Newage International, Inc. The device weighs 30 ounces, and gives a direct reading when the handles on the sides are pressed.

159 CLEANING, COATING SIMULTANEOUSLY:

A wipe-off metal cleaner that leaves a phosphate coating is being manufactured by Westville Laboratories. The cleaner, called Metal-Redi, is said to leave a firm bond for all types of paint. Literature available from the company.

160 HIGH-LUSTRE FINISH FOR DIE CASTINGS:

A high-lustre baked-on finish designed to replace brass plating on zinc alloy and aluminum die cast parts is described in literature offered by Standard Industrial Products.

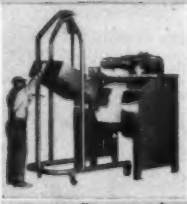
ALMCO Supersheen

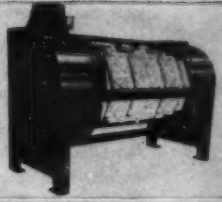
"TWIN" MODEL DBO-1

the Mighty Midget of Barrel Finishing

THE LARGEST SELLING BARREL FINISHING MACHINE IN AMERICA!

- The "standard of the industry" for processing (1) small lots of parts (2) close tolerance work (3) sample processing (4) research and development work.
- Low in price. Extremely versatile. Handles wide range of parts. Turns out better finishes FASTER than any machine in its price class.
- Variable speed drive, 25 to 60 RPM. Two compartments 8" x 16". Neoprene lining optional.
- Cam-type operating doors. Heavy welded steel construction throughout.
- A COMPLETE unit. No auxiliary equipment needed. Removable screening drawers speed loading, unloading and separation of parts from media.





Never-ending research and development have made ALMCO Supersheen barrel finishing equipment the most advanced on the market. Almco supplies EVERYTHING needed for advanced barrel finishing . . . a complete range of barrel sizes up to 30" by 60", time-saving handling equipment, ALL of the basic types of abrasive chips and compounds.

ALMCO Supersheen

AMERICA'S LARGEST MANUFACTURER OF ADVANCED BARREL FINISHING EQUIPMENT—MATERIALS AND COMPOUNDS

ALBERT LEA, MINNESOTA

NATIONWIDE SWING TO BARREL FINISHING BY METAL FINISHING INDUSTRIES

Almco Supersheen ADVANCED barrel finishing equipment has solved the manpower problem in the finishing department for many manufacturers. Many more manufacturers are now making installations of this labor-saving equipment. It is an investment that pays off handsomely in direct labor savings, increased production and better finishes (TO ALMOST ANY DESIRED MICRO-INCH READING)

FINISHING COSTS SLASHED

Where the advanced Supersheen barrel process is used, there is no lower-cost method of finishing metal parts. Some manufacturers report that Almco Supersheen equipment has paid for itself in only two months. We know of no installation that hasn't paid for itself in less than a year. A single unit installation replaces from two to twelve men. In ten typical Supersheen installations, finishing costs average 80.1% less than former methods—from 48% on a threaded cast iron pipe "T" to 95% savings on a small trigger with intricate configurations.

ABSOLUTE CONTROL— MAXIMUM VERSATILITY

Advanced barrel finishing is the only mass finishing method with absolute control over results. By varying certain operating conditions, it is possible to produce almost any desired finish. The Almco Supersheen process is now used in a multitude of operations—deburring, grinding, cutting down, cleaning, forming uniform micro-exact radii, improving surface finish, reducing surface porosity, finishing threaded and intricate parts, removing paint, coloring, burnishing, etc.

FREE SAMPLE PROCESSING

Almco maintains America's largest and most complete sample processing and research facilities. Sample processing is done on a no-charge basis. We invite YOUR samples and inquiry.

This new booklet will really open your eyes to ADVANCED Barrel Finishing! Write for Booklet D-5

It's FREE!

ALMCO Supersheen, Albert Lea, Minn.

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BATTELLE INSTITUTE CREATES NEW POST

Dr. Bruce W. Gonser has been appointed to a newly created assistant directorship at the Battelle Memorial Institute, Columbus, Ohio. He will be in charge of the less common metals there. The Institute has a budget exceeding one million dollars a year for research on these metals.

Dr. Gonser, who holds degrees from Purdue University, University of Utah and Harvard University, has been with the Institute since 1934, after being associated with the American Smelting & Refining Co., the Superior Zinc Corp. and the National Radiator Corp.

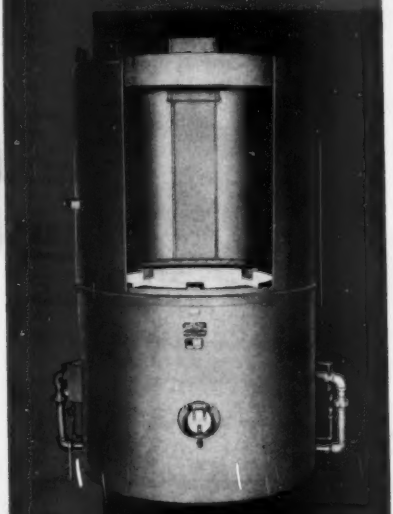
Dr. Gonser has been active for many years in the Tin Research Institute, the Electrochemical Society, the American Institute of Mining and Metallurgical Engineers, the American Society for Metals and the American Society for Testing Materials.

Y. F. HARDCASTLE OF PENNSALT DIES; WITH COMPANY 40 YEARS

Yellott F. Hardcastle, a director of the Pennsylvania Salt Mfg. Co., Philadelphia, died February 4, 1951.

Mr. Hardcastle joined the company in 1909. He became vice-president in charge of manufacturing in 1928, and held this position until he retired in 1949. He was elected a director of the company in 1948, a position he held at the time of his death.

ECLIPSE MELTING FURNACES



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The Eclipse SM-22 Melting Furnace (at left), with a pot size 22½ by 14¼ inches, has a pot capacity as follows: tin, 1100 lbs.; lead, 1800 lbs.; zinc, 1170 lbs.; aluminum, 440 lbs. Other sizes available, both larger and smaller.

Eclipse Fuel Engineering Company
ROCKFORD — 723 SOUTH MAIN STREET — ILLINOIS
McKee Eclipse

CURRENT REVIEWS

Book reviews, abstracts of current articles and descriptions of products and processes of special interest to the designers, purchasers and finishers of die castings are included in this department.

FIRST SAFETY MANUAL FOR DIE CASTING INDUSTRY TO BE ISSUED BY ADCI

SAFETY IN THE DIE CASTING PLANT is the subject of a new 78-page manual which comes off the presses this month. This manual, written by die casters who have made an intensive study of safety procedures and equipment, is designed to be of particular assistance to small and medium-sized die casting plants.

This first complete study of safety in the die casting field has been carried out as a project of the American Die Casting Institute, 366 Madison Ave., New York 17, N. Y., from which copies can be obtained. Price of the publication is $5.00.

The first section deals with general plant procedures, including methods of setting up a safety system. Another section deals with departmental recommendations, giving each department, from materials receiving to packing and shipping, a coverage of safety methods and hints for safe operation of machines and equipment. A special appendix contains blueprints of safety devices, typical record and report forms and a list of safety organizations, textbooks and literature and periodicals.

HOW TO RUN A LATHE

South Bend Lathe Works, South Bend, Ind., 50th ed., 128 pages, $.25 paper-bound, $1.00 imitation leather-bound.

The 50th edition of How To Run A Lathe is intended to be a source of reference for skilled machinists and a textbook for students. It contains 11 chapters written in non-technical language to make it easy for the beginner to understand.

The text covers such items as the correct installation and leveling of the lathe, grinding cutter bits, turning, boring, thread cutting, taper turning, drilling, reaming, tapping, machinability

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rating and cutting speeds for various kinds of steels; standard tolerances for press fits, running fits, push fits and sliding fits; allowances for finishing turning, filing, polishing, grinding, reaming, lapping and honing.

METALWORKING LUBRICANTS

By E. L. H. BASTIAN
McGraw-Hill, New York, N. Y., 357 pages, $6.00.

The nature, selection and application of lubricants and fluids are discussed in this book, which covers all types of fluids and compounds used to facilitate metalworking processes.

Although it deals primarily with practical plant and shop problems, the book also contains technical and theoretical explanations of the problems involved in the use of metalworking fluids and lubricants.

One chapter is devoted to mold coatings. A section of this chapter deals with die lubricants for die casting operations. Some old rule-of-thumb formulas are given, together with more recently developed compounds, such as the silicones.

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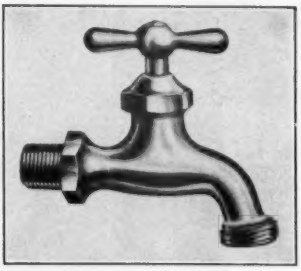

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AMORPHOUS PHOSPHATE COATINGS FOR PROTECTION OF ALUMINUM ALLOYS AND FOR PAINT ADHESION

By ALFRED DOUTY and F. P. SPRUANCE, JR.

Reprinted from the 36th Annual Proceedings of the American Electroplater's Society. Available on request from the American Chemical Paint Co., Ambler, Pa. 24 pages.

This report, as the title indicates, deals with an amorphous phosphate coating for aluminum. The new coating is compared to the common forms of aluminum protection by adherent inorganic coatings, as to structure, adherence, corrosion resistance and its other properties. Complete tables and charts show the results of the work on this coating, and although at the time of the report the work was not complete, a good deal of information on the application and characteristics of the coating is given.

Primarily, according to the report, work was started on this project with the object of increasing the adhesion of paint to aluminum and to lengthen the life of painted aluminum articles. It was realized after work had progressed that the film itself had corrosion-resistant properties, and development was begun to improve these properties. No crystalline structure of diffraction pattern has been detected in the coating. It is dense, rather hard, and apparently non-porous. It is not absorptive and cannot be dyed or stained. Coatings of normal thickness show high electrical resistance.

WILLIAM BLUM HONORED

Dr. William Blum, chief of the electrodeposition section, National Bureau of Standards, has been honored by the Electrodepositor's Technical Society of London, England, by his election as an honorary member.

OPPORTUNITIES

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PURCHASES DIE CASTING PLANT

Product Engineering Co., Portland, Oregon, has expanded its operation with the purchase of all die casting machinery belonging to the Pacific Die Casting Company of the same city, according to Ralph D. McGilvra, president.

The sale included all die casting and related equipment formerly operated by Pacific. In addition to the machinery, Product Engineering Co. has added all personnel formerly employed by Pacific in their die casting department.

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BEDFORD, OHIO

BARREL FINISHING

(Continued from Page 53

ly deeper embossing or intaglio effect, or a broadening of the base of some lettering.

If flashed over openings can be placed so that it is possible to die trim them, prior to tumbling, the operation will be simplified. There is a difference of opinion among tumbling specialists concerning the success of removing flash from such openings, although the selection of proper tumbling medium and the addition of appropriate metal shapes such as tumbling stars to the batch are being employed successfully in some cases.

Location and size of cored holes is determined by functional needs of the product and can rarely be adjusted to conform with tumbling practice. However, selection of proper size of tumbling media will eliminate catching of chips in blind holes or the damaging of internal screw threads.

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From the foregoing, it should be obvious to the production finishing man that barrel finishing offers many possibilities in lowering costs and obtaining a better surface. The advantages of barrel finishing in processing large quantities of die cast parts in a minimum amount of time are also worth consideration.

Barrel finishing, however, is not a cure-all. Certain die castings will be out of the barrel finishing picture because of size, shape, deep recessed holes that require a bright finish and parts where selectivity of finish is desired.

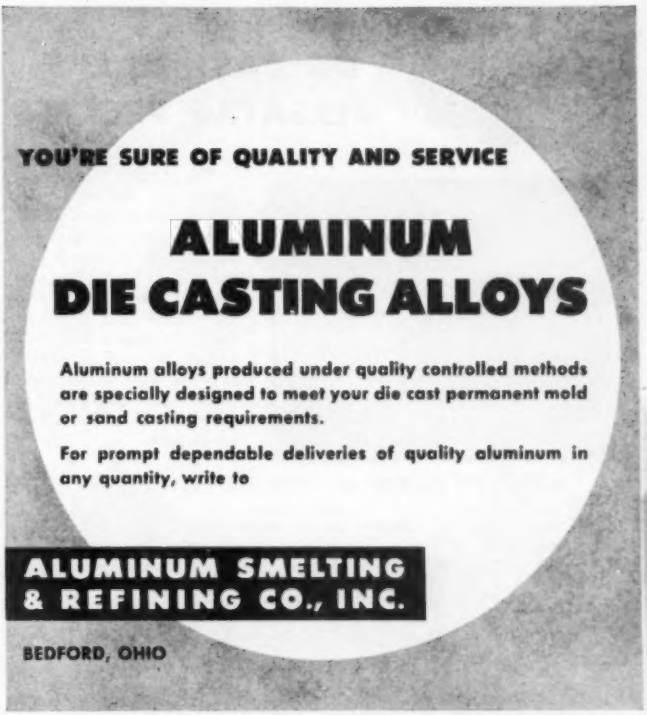
In any event, before deciding on barrel finishing for a given part, the production engineer should consult one of the companies specializing in the field. Many of these companies maintain completely equipped and well-staffed laboratories which are in a position to decide whether barrel finishing is practical and economical for a certain die casting; and if barrel finishing is to be used, they can recommend media compounds, barrel speeds, time cycles and other factors to give the finisher the best possible results.

Barrel finishing has only recently evolved from a method of rough finishing of iron sand castings to a precision method of high-lustre finishing metal parts. Die castings, which are usually comparatively small, easily worked and produced in large quantities, should continue to benefit from advances in the barrel finishing process.

---

*The editors of DIE CASTINGS wish to thank the many individuals and companies who have contributed information for this presentation on the barrel finishing of die cast parts. Among the sources of information have been the following:

Almco Div., Queen Stove Works, Inc.
Enthone, Inc.
Grav-i-Flo Corp.
Frederick Gumm Chemical Co., Inc.
Minnesota Mining & Mfg. Co.
Metals Finishing Corp.
D. J. Murray Mfg. Co.
Norton Co.
Oakite Products, Inc.
Roto-Finish Co.
Tumb-L-Matic, Inc.
Wyandotte Chemicals Corp.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DIE CASTING IS A VERSATILE PROCESS

The Large pump head shown is a zinc alloy casting approximately 9" in diameter and weighing 4½ lbs. Smaller four tooth pinion held in hand (also zinc die cast alloy) is less than ¼" across and 2100 of them are required to make a pound. We will be pleased to work with you on your needs — just send prints or samples and specifications for estimate.

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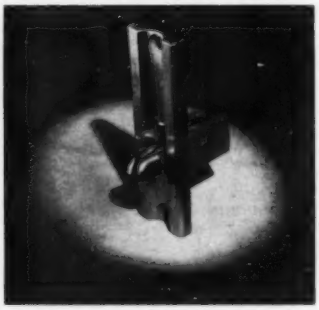
Detroit: 715 Donovan Bldg. • Los Angeles: 10583 Holman Ave.
Affiliate of Tri-State Plastic Molding Co., Inc.

FOLDING DOOR

(Continued from Page 33)

and is engaged by a spring-loaded catch on the door jamb. The uniformity in cross-section obtained by die casting is an important gain over the brass parts previously used; to provide a flush fit, desirable from both the functional and appearance stand-points, the grooved plate contour must conform to that of the molding.

The release mechanism can also be provided with a tumbler lock on either or both sides of the door. The company, unable to find a lock which would fit in the 1-1/16 inch space on the inside of the channel which forms the door post, designed a special lock for the door. Die cast parts in the lock include escutcheon plates, knobs, face plates and interior levers. The other parts in the lock are made up of steel stampings and springs. Action of the lock is rather simple, consisting of a key-operated lever that holds the latch in the release mechanism. The company buys the lock parts finished and ready for assembly.



The latch and keeper for the FolDoor, shown above, are both die cast in zinc alloy. Die castings replaced brass sand castings in the FolDoor.

Although door knobs, lock parts and brackets are not new applications for die castings, the experience of the Holcomb & Hoke Mfg. Co. does show that it pays dividends when company engineers look at parts with an eye to the possibility of die casting them.

REALISTIC DETAIL

(Continued from Page 22)

The word "Coins" alongside the cored slot is made by the die and thus the cost of an extra stamping or engraving operation is saved. While the projecting base simulates the kick plate on a commercial cigarette vending machine, the ledge on three sides of the cabinet also serves a useful purpose by giving stability through extra weight at the bottom.

Any other method of fabrication would have entailed complexities of design as well as assembly. As a stamping, the cabinet would have had to be made from three separate pieces assembled by spot welding. These welding spots would have brought a finishing problem in view of the flawless surface finish that is required.

From the standpoint of design, production and sales appeal, the die cast unit has given the best possible combination of features.

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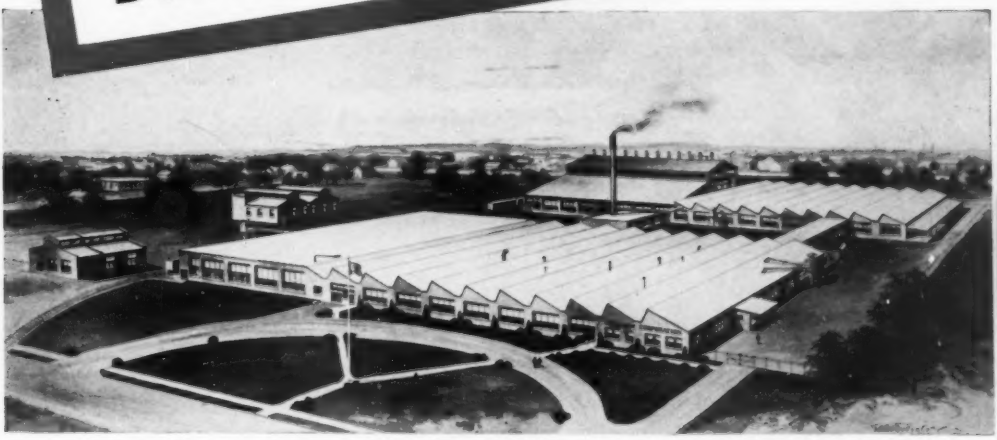

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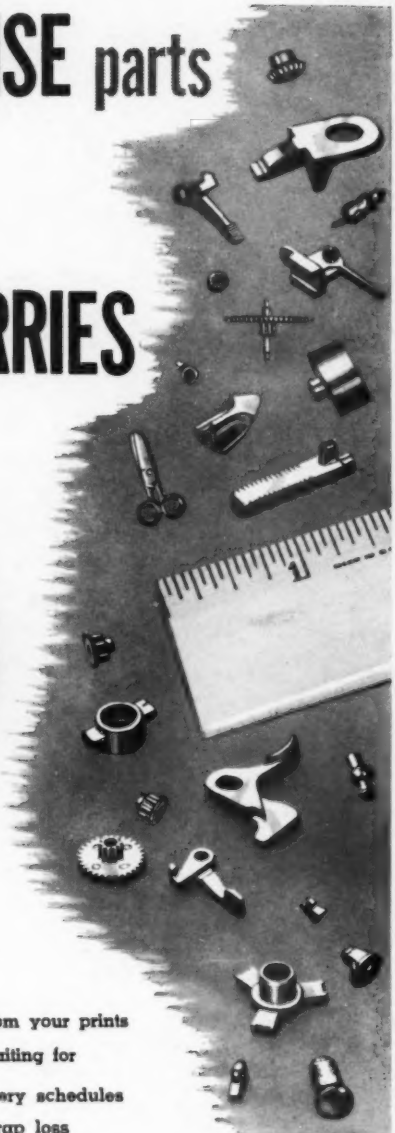

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SPRING WASHER. Formerly stamped; die casting permitted design improvement.
CUP GEAR. Originally a 3-piece assembly, stamping, screw machine & wire form.
PUNCTURING PIN: Was aluminum screw machine part.

GRC

Max. Wt.-½ Oz.
Max. Lgth.-1¾"
SMALLNESS UNLIMITED

GRIES REPRODUCER CORP. 800 East 133rd St., New York 54 ● MOtt Haven 9-2476